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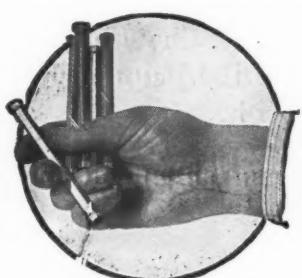
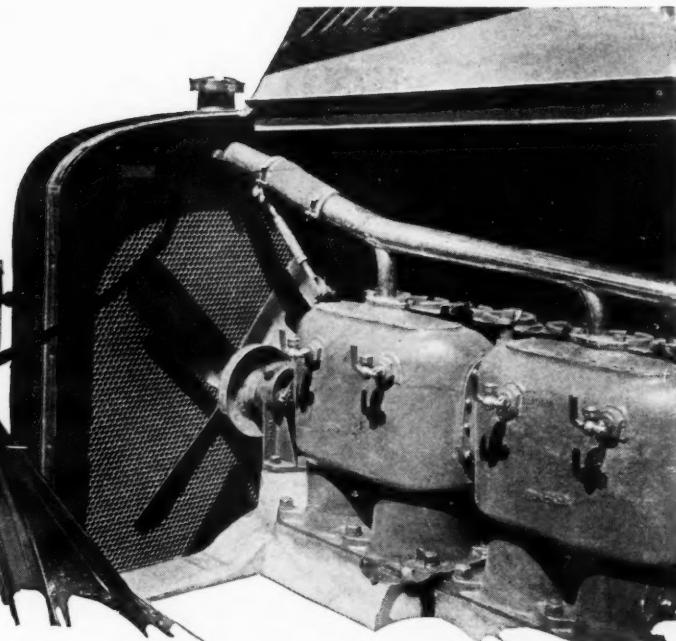
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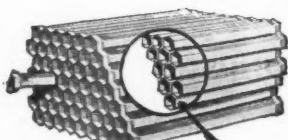


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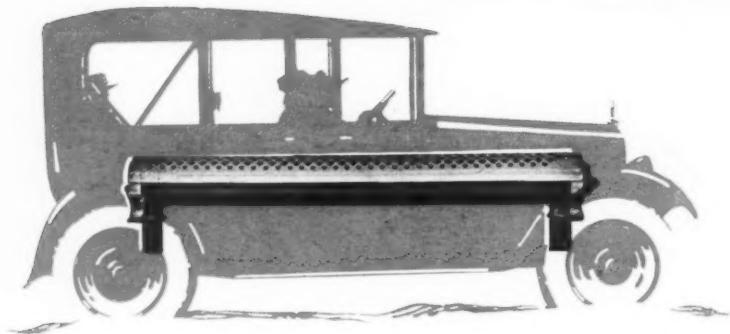
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLI

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No. 18

Constructive Comment On Tractor Design

Continuing his excellent account of the English tractor trials at Lincoln, begun last week, Mr. Bourdon takes up the engineering features of design. Many things, applicable as well to the United States, are discussed, based upon the experience at Lincoln and of users throughout the British Isles. If you are interested in tractors, you should read this article

By M. W. Bourdon*

SO diverse were the general arrangements of the competing tractors at the Lincoln trials that it was almost impossible to divide them all satisfactorily into well defined groups or classes, other than wheeled and chain track types. The most pronounced group included the Fordson, Fiat, Austin, Wallis Junior and Glasgow, the distinguishing feature being the unit system of construction of engine, clutch casting, gearset, and driving axle. Without doubt, this general arrangement has the merit of simplicity of outline, but, while this is a point that appealed forcibly to a large proportion of farmers, as well as farm haulage contractors, who had not used such machines, there were not a few of those who had used them who were loud in their adverse criticisms. The inaccessibility of the internal parts of the combined units and the need for handling excessively heavy weights when, for example, a gear wheel needed replacement or a ball

bearing was to be renewed, were the chief points of criticism.

Judging from the comments of users, it seems possible that, although this type of tractor may have wide popularity and large sales in the immediate future, its original adherents, when the time comes for buying another machine, may demand something with more easily accessible details, even though this feature be gained at a loss of neatness and apparent simplicity. That this tendency already shows signs of development was evidenced by the great amount of interest taken in the Weeks-Simplex machine, for example. This little tractor, which behaved most creditably, has its engine and gearset separately mounted on a channel steel frame and drives through spur pinions on a countershaft to enclosed gear rings on the back wheels. It has a neat appearance and can be improved still further in this respect without departing from the general idea of its construction, although, clearly, it can never be the equal of the unit type in this way. Its final drive was the subject of both criticism and favora-

*Correspondent of Automotive Industries in the United Kingdom.

ble comment, for, although the bull gear system generally was referred to as crude and unworkmanlike by some observers, mostly automotive engineers, it was obviously favored by many agriculturists and agricultural engineers.

Exposed to dirt and dust, unlubricated in many cases, the bull gear gives the impression of being a "brutal" method of final drive, but there is plenty of evidence of its success in operation and quite a simple job is involved when renewal of its components is necessary because of wear. It must be remembered that the British farmer's tractor—if not that of farmers in other countries—will be repaired and kept in order by the village blacksmith in many cases, a man whose knowledge and abilities in matters mechanical are distinctly limited. At best the machines will have the occasional attention of the garage mechanic in the nearest town; such "experts" are more qualified to deal with tractor repairs than are the village blacksmiths, but they have not by any means a fitter's training behind them, taking them in the lump. They are almost "jacks of all trades," and must be able to turn their hands to simple fitting, rough machining, carbureter adjustment, diagnosing ignition troubles and even upholstering and repainting on occasion.

Tractor Design

If, therefore, tractor design calls for the service of a trained fitter when renewals are necessitated, it will be bad for the tractor; it will receive such skilled attention in few cases. A unit system that, to insure the satisfactory fitting of parts that may require renewal from time to time, needs more mechanical ability than is possessed by a garage mechanic will not long survive. This is not only the writer's personal opinion but one freely expressed at Lincoln.

Many tractor designers, too, obviously do not keep always in mind the class of man under whose hands the machine will operate. The farm hand may have the best of intentions, but his knowledge of things mechanical has hitherto been confined to the plow and similar farm implements; he has generally not even been trusted to adjust a reaper and binder.

The automotive engineer knows full well that the simplicity demanded by farmers can be attained only up to a certain point. There is a definite number and variety of parts needed to make the crudest farm tractor. Therefore, it is not so much simplicity that is advocated by the discerning, but it is emphasized that specific designs and general arrangements are to be avoided if they involve great care and skilled fitting in the replacement of details subject to wear or possible fracture, and if they cannot stand up to the rough attention that the farm hand will give them. One or two designs at Lincoln were pleasing to the eye of the engineer, but they did not give the idea that they would long survive the treatment they will receive in normal use.

Wheel and chain track machines both found favor for work on the land, although for hauling the wheeled type is unquestionably the better on the hard granite roads of England. The chain tracks are not needed for such work, although some means for securing better adhesion on stiff gradients than is given by iron-

tired wheels is required, as the hauling tests showed. The detachable rubber pads or tires used by Austin, Wallis Junior, Alldays and Garner, among others, were favorably received, and the exhibition stand of the Dunlop Rubber Co., the makers of both the circular and rectangular types of pads, was the scene of innumerable inquiries from farmers and others interested in tractor haulage.

The circular rubber pads on a metal base are $3\frac{1}{2}$ in. in diameter and each is secured to the metal wheel by a stud and nut, the former passing through a hole vacated by the bolt of a driving stud or cross stoke. The rectangular pads, also on metal bases, vary in dimensions from $7\frac{1}{2} \times 7\frac{1}{2}$ in. to $12 \times 7\frac{1}{2}$ in., and each is held to a wheel by two studs and nuts.

The Garner tires, in three segments, have at several points a hook at one side and a hinged clamp at the other. This grips the outer edges of the wheel rim and enables the segments to be easily fitted and detached. For field work the Garner detachable cross strakes can be fitted in place of the tires. The strakes are similarly arranged on three segments of an outer rim and the latter is attached to the wheel rim by the same system of hooks and hinged clamps.

Air cleaners of the gauze, water or centrifugal types were fitted to about half the number of machines in the trials. The tractors so equipped were mostly of American make, though the Fiat had one of the water type. British tractor makers do not apparently consider the air cleaner essential; but, though its usefulness may be confined to only twelve or fifteen days in a season—so rarely does the British soil, especially in the heavy lands, become really dry—an air cleaner in one form or another is undoubtedly a desirable fitting. As yet, however, its desirability is not realized by many British farmers and the nearest idea they have as to its real use is an impression that it is fitted to prevent the choking of the carbureter jets.

The Land

The land treated during the Lincoln trials was almost flat—there were no gradients worthy of mention—and yet many of the tractor engines were clearly exerting their utmost in hauling three plows in the heavy soil. In few parts of Great Britain can such flat fields be found, and if a machine is to serve for a three-furrow 9×5 in. or 9×6 in. plow in the country generally it should have either two useful plowing speeds, say $1\frac{1}{2}$ and $2\frac{1}{4}$ m.p.h., or an engine that will serve for at least a 5 per cent gradient. Four cylinders, 4×5 in. or less, will not suffice on heavy land for a three-furrow plow on any gradient worthy of the name, despite the claims of some salesmen and manufacturers. Engines will not be kept in the best of tune by users, and at least $4\frac{1}{2} \times 6$ in. is required for undulating fields.

Two-cylinder motors are, however, viewed with a good deal of favor by British users, and the Overtime, Titan, Saunderson and similar machines have a wide and increasing circle of friends. They are not neat in appearance and are heavy, but they have been doing good work and have enviable reputations among most of their users.

The three-wheeled machines, apart from the Glasgow, were viewed with a certain amount of suspicion

by potential buyers and, judging from personal inquiries made among a considerable number of the latter, at least 70 per cent of them favored four wheels in two tracks with, of course, three-point suspension. Such machines serve for plowing with all wheels on the unplowed land, or with two in the furrow, and, in view of the marked difference of opinion among farmers concerning these two methods, the tractor manufacturer would seemingly be taking a wise course in offering a machine that would appeal to both schools.

Tractors running on the unplowed land are obviously called upon to resist a heavy side draught, and instances were observable at Lincoln of machines proceeding semi-crabwise owing to the poor adhesion of the steering wheel or wheels. Weight distribution is a factor bearing on the point, but lack of sufficient weight to give the desired steering grip of the land can, to a limited extent, be overcome by a central flange standing out at right angles from the wheel. Such flanges quickly become caked with soil and lose their effectiveness, it is true, and there seems to be a call for permanently fitted scrapers—one on each side of the flange, to clear the soil as it is lifted on the wheel. This principle is seen on the majority of British steam road rollers and well serves the purpose in view. Vertical flanges on the steering wheels, in any event, might well be of greater depth or height, easily detachable and not secured by an endless number of bolts and nuts, as is now the case.

Detachability

The latter point arises in regard to driving-wheel lugs and studs; quick detachability is required, and the Garner system just referred to is a decided step in the right direction. It must be remembered that a British field of 40 or even 30 acres is exceptional—there was only one of over 40 acres at Lincoln—and farmers are not allowed to run their tractors from field to field on the public highways with studs, lugs or vertical flanges on the wheels. It will be seen, therefore, that a great deal of time can be wasted during a working week if those fittings can only be removed and replaced by manipulating innumerable rusty nuts and bolts. Flat steel bands temporarily sprung over lugs partially solve the problem, but they are not the final solution.

The maneuvering of the tractors at headlands left little to be desired, although pronounced agility was called for when a self-lift plow was in use. Even then the driver-demonstrators, adept though they were in comparison with the average farmer's man, occasionally found their hands full in operating the plow and simultaneously steering the tractor, working the clutch pedal and regulating the engine throttle on ungoverned engines. Only a few machines had pedal throttles, although these are desirable when two hands are otherwise occupied and neither is available for throttle lever manipulation. The right foot is free, if the left be busy with the clutch, and a throttle pedal might well be a universal fitting.

The small size of the average British field means turning at the headlands after every 200-300 yd. of plowing, and ease of maneuver is therefore an important consideration. Most of the fields in other than flat districts have a ditch against each of the hedges,

and an omission on the driver's part, through his being "too busy," may easily land tractor and plow in a 4-ft. ditch.

Engine starting from cold presented too much difficulty in one or two instances, and magneto ignition without an impulse starter calls for more strength and knack than should be necessary. Impulse starters and even half compression devices are desirable in engines larger than 4x5 in. A poor show was made by one tractor in front of a group of potential buyers when three of the maker's own men had more than they could do to start the engine until they had occupied nearly ten minutes taking turns at the starting crank.

The large number of points requiring individual lubrication was a point of criticism in a few instances. Chain track machines are notorious offenders, but some wheeled tractors were by no means free from blemish in this respect. There is room here for improvement, without doubt.

Definite opinions as to reliability and resistance to wear could not be formed during the three days' use of the machines. A few stops of brief duration were made, but need for only minor adjustments was the cause, and one heard practically no criticism from farmers on the question of reliability. What might happen to some of the machines after more prolonged use it is impossible to say, but flimsy controls and a few very light steering connections were viewed with suspicion by possible users.

On the whole, then, the tractors gained credit for themselves and the industry in general. Tractor manufacturers may yet have something to learn, if it be only the fact that conditions of use vary so greatly in America and England that specially designed machines for the latter may be needed to fulfill all requirements. Springs to both axles is an instance, if a machine is to be offered for both field and road work.

Scottish Tractor to Be Manufactured on Large Scale

THE construction of motor tractors for agricultural purposes will be started shortly by the Wallace Farm Implements, Ltd., a company which has been formed at Glasgow for the purpose. The National Projectile Factory, Cardonald, has been purchased from the Government and work will be commenced as soon as the necessary plant is installed. The new company includes the firms of John Wallace & Sons, Ltd., agricultural engineers, Glasgow; the D. L. Motor Manufacturing Co., Ltd., Motherwell, and the Carmuirs Iron Foundry Co., Ltd., Falkirk.

The factory at Cardonald was one of the permanent factories erected for the manufacture of shells, and was the largest of its kind in the Kingdom. The buildings alone cover about 12 acres, and the site extends to about 24½ acres. When work has been fully set going employment will be provided for between 2,000 and 3,000 workmen.

Production will be on the "mass" principle, and it is anticipated that over 5,000 tractors will be completed annually. The type of tractor to be built is well known to agriculturists all over the country as the "Glasgow tractor." The claim is made that with it the farmer is not required to wait for dry weather to use the machine. The machine has two wheels in front and one at the rear, all power driven.

Description and Features of the British Tractors

Although following American tendencies in many instances, the British tractors on view at the Lincoln trials offer much that is novel, new and interesting to designers and builders in the United States. Mr. Bourdon has given herewith the salient features of the English models, including also the Italian Fiat. Thus the post-war mechanical program of the British makers is presented in a complete and comprehensive manner, compelling the close attention of the tractor industry in America.

By M. W. Bourdon

BRITISH tractor design, which shows tendencies in many instances to follow American practice, was, of course, well illustrated at the Lincoln trials. Practically all of the English makers were represented, many of them rushing completion of new models so that they might be represented.

Descriptions of the British models are given herewith in more or less detail. The American machines, of which there were several models, are not described as their mechanical features already are well known. All of the makes mentioned here are of British manufacture, excepting the Italian Fiat. The British list follows:

Austin, Clayton, Glasgow, Martin Motor Plow, Pick, Weeks-Simplex, Blackstone, Crawley Motor Plow, Mann, Martin Tractor, Saunderson.

The Austin

The general design of this tractor, which is the product of the makers of the Austin touring cars and trucks, whose factory is near Birmingham, England, bears a close resemblance to the Fordson, for the engine, clutch housing, gear casing and back axle are bolted together, forming a unit suspended at a single point on the front axle.

The four-cylinder engine has a bore and stroke of $3\frac{3}{4} \times 5$ in., the cylinders being cast as a block with an overall detachable head.

Lubrication is maintained by a gear wheel pump forcing the oil through the hollow crankshaft to the big-ends and piston pins. A magneto is used for ignition, while water circulation is maintained on the thermo siphon system. Kerosene serves as fuel for normal running, the tank containing 10 gal., gasoline being used only for warming up.

The transmission comprises a steel cone clutch with fabric lining, and bevel gearing to the first motion cross shaft; thence the drive is through the two-speed and reverse gear-set and to a large spur wheel on the back axle differential. The gear shafts all run in roller bearings and the transmission provides forward speeds, at normal engine revolutions of $2\frac{1}{2}$ and $4\frac{1}{4}$ m.p.h. and 2 m.p.h. on reverse. The controls, in addition to the usual throttle and gear levers and clutch pedal, include two brake levers which apply directly to brakes on the rear wheels.

A detachable belt pulley is provided, having a diameter of 24 in., and the machine, when its driving wheels are fitted with special pads instead of spuds, is claimed to be capable of hauling 4 tons on the road up a gradient of $8\frac{1}{2}$ per cent at 5 m.p.h. The weight of this machine is 2,900 lb. Its price f.o.b. Birmingham is £300 (approx. \$1,500).

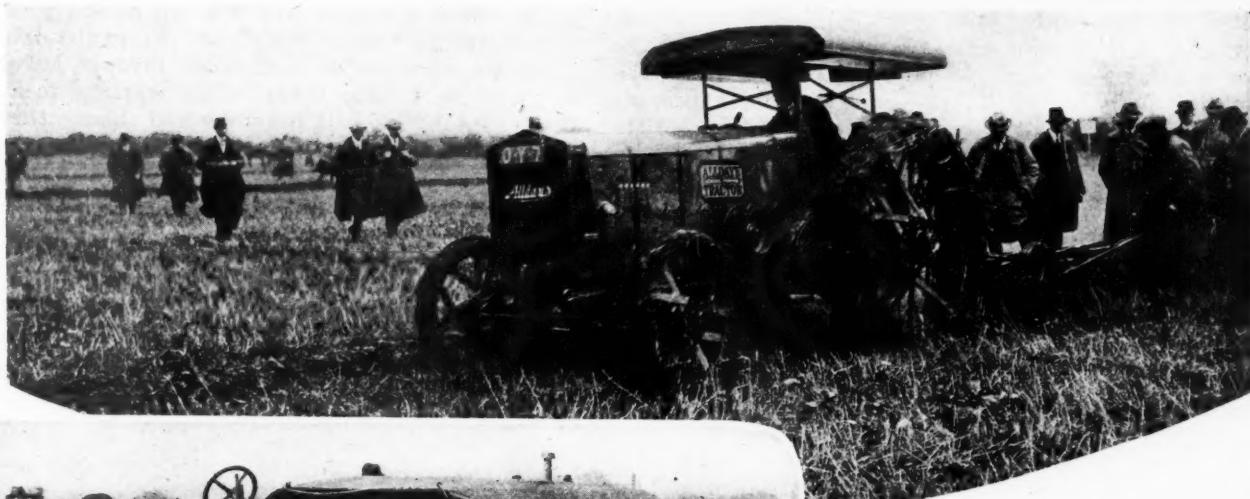
The Blackstone

This British make was represented by two types, one with four wheels and the other a chain track machine. The first-mentioned did not, however, materialize after the dynamometer tests and took no part in the actual trials. The special feature of each machine is the engine, which has three cylinders $5 \times 6\frac{1}{2}$ in. in a block and low-tension magneto ignition. The charge is fed to each cylinder directly, without carburetor or vaporizer.

Three small pumps, one for each cylinder, force the fuel in the form of a fine spray into the combustion chambers, the kerosene issuing from a jet having at each side an inlet through which air enters by way of a mechanically operated valve under a pressure of 80 to 90 lb. per sq. in. To increase turbulence and so assist combustion, side passages are provided between the combustion chamber and the space around each fuel jet; the rush of air and fuel spray straight into the cylinder induces currents from the combustion chamber through these sideways to mingle with the ingoing charge. The fuel and air, it is claimed, are thus intimately mixed and given a whirling motion and are brought to a suitable state for combustion when the spark occurs.

The engine, which operates on the four-stroke cycle, is made reversible by a sliding camshaft and is rendered self-starting from cold on kerosene by a system of admitting air at 300 lb. pressure from a chamber kept charged by a compressor. A lever, operated from the driving seat, serves to slide the camshaft to a point where special cams open the valves at each crankshaft revolution, making the engine work on a two-stroke cycle, compressed air being admitted and exhausted respectively on each downward and upward movement of the piston. The crankshaft is thus given a "swing," and a quick return movement of the lever to its usual position causes the valves

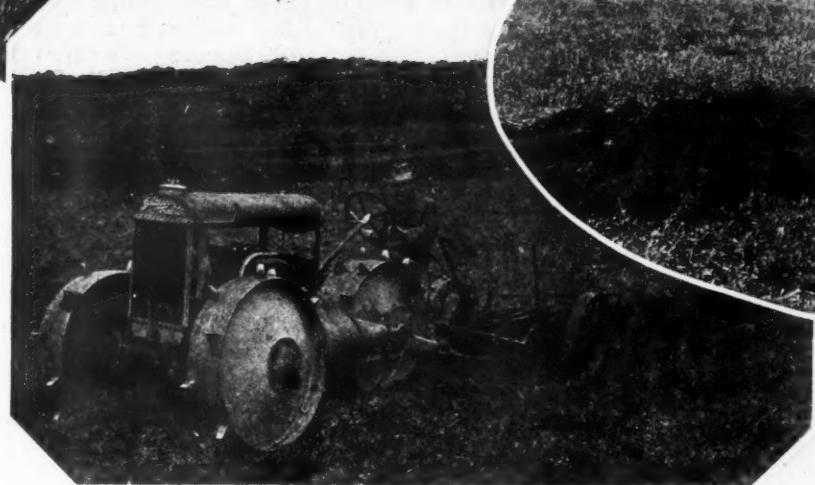
Scenes From the Lincoln Tractor Trials



The Alldays was a widely-watched British machine. It is shown above. The Grey is illustrated on the left



The Martin plow and tractor shown above and below



The Glasgow was one of the most novel of the many interesting designs. It attracted wide attention



to operate normally and the initial explosions to occur before the flywheel loses its momentum.

This engine has been in use since 1915 for stationary plants, but has only just been applied to tractors. Whether it will prove a satisfactory power plant for the latter remains to be seen; offhand one imagines that the retention of air at 300 lb. pressure will alone present some difficulty, judging from the experiences of motorists in days gone by with air starters and their essential accessories. The engine can be started by cranking if pressure be lost while the machine is out of use, but even then it starts up on kerosene without the application of external heat.

The air and fuel pumps are other rather delicate fittings which the farm hand may handle roughly and damage beyond repair. The engine seemed to be decidedly susceptible to variations in quality of fuel and to have frequent fits of misfiring while plowing was in progress.

The Clayton

This machine, made by Clayton & Shuttleworth, Lincoln, affords a good example of the chain track or creeper type. Each chain track passes round two wheels, that at the front serving merely to keep the chain taut and having a plain rim, while the rear wheel on each side is toothed and conveys the drive to the track. Neither of these wheels is intended to bear the weight as a primary purpose, there being four small roller wheels between the large ones on each side to take the greater part of the load. The weight of the top of the track is borne by two rollers. Both tracks pivot about the shafts of their driving sprockets or wheels, and at the front the idler wheels are connected together by an axle and equalizing levers, which arrangement allows each track to move in a vertical path independently of the other when traversing uneven ground.

Steering control is by means of a pair of clutches, one on each side of the bevel gearing, by which the countershaft is driven. At the outer ends of this countershaft are roller pinions that engage with and drive the sprocket wheels of the creeper. The clutches are operated by a steering wheel that enables one or the other to be thrown out of action; for short turns each clutch casing has a band brake applying to it when it has been disengaged.

The engine has four cylinders, cast in pairs, with a bore stroke of 120x140 mm. (4 $\frac{3}{4}$ x5 $\frac{1}{2}$ in.). It is a standard truck engine made by Dormans, the engine specialists. It burns kerosene.

The Crawley Motor Plow

This is a convertible machine—convertible from a tractor plow to a tractor. As a plow it runs on two main driving wheels and a small trailing wheel behind the plow frame. Steering is accomplished from the driver's seat, at the extreme rear beyond the trailing wheel, by means of a wheel that takes effect upon the trailing wheel through a rack and pinion, or by a lever by which the drive to either main wheel can be released for turning sharply at headlands.

The engine is suspended in a channel steel frame well in front of the axle of the driving wheels, and approximately balances the weight of the plow frame, control gear and driver. It is under a sloping fronted hood, and behind it is a high tubular radiator through which the water is circulated by a centrifugal pump. The four cylinders are of the L head type 4 $\frac{1}{8}$ x5 $\frac{1}{2}$ in. and three white metal bearings support the crankshaft with laminated shims between the caps and top housings. Ignition is by magneto. A Rayfield carburetor is used with gasoline as fuel.

Transmission occurs through an inverted fabric—covered cone clutch (lever operated) and two flexible couplings to a gear-set giving two speeds forward and a reverse. Speeds of 2 $\frac{3}{4}$ and 3 $\frac{1}{2}$ m.p.h. are given at the normal engine rate of 900 r.p.m. From the driven shaft of the gear set the drive is taken through bevel gearing mounted on Timken taper roller bearings to a countershaft running on ball bearings and thence through dog clutches and spur pinions which engage with large diameter gear wheels bolted to the wheel hubs.

The plow is hung under the rear extension of the main frame and is pulled directly from the main axle. The three bottoms of the standard equipment are suspended from the plow frame, which is mounted fore and aft on swivel bearings that permit it to be tilted to allow all the shares to enter the ground to an even depth when opening or closing a furrow. The plow frame is under control from the driver's seat and can be lifted, lowered or tilted at will.

The tractor attachment consists of a swivel wheel fore carriage for attaching to the front end of the main frame and a foot plate with the seat, steering wheel and operating levers mounted on it for attachment to the rear end of the main frame—the rear frame, plow and plow-lifting controls having first been removed. The front wheel is carried within a swivel fork, controlled by worm gearing from the hand wheel. Thus altered, the machine can be used for cultivating and hauling, although for the latter purpose the plow frame may be used for carrying a cultivator with the machine as normally constituted.

This machine sells for £500 (\$2,500), not including the tractor attachment fittings.

The Fiat

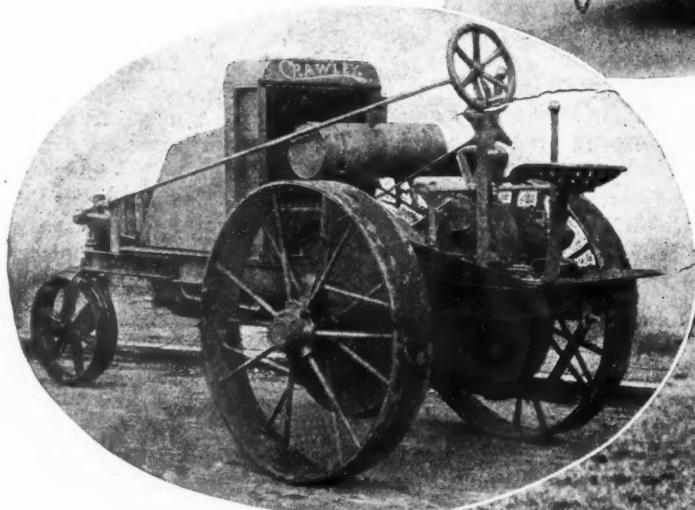
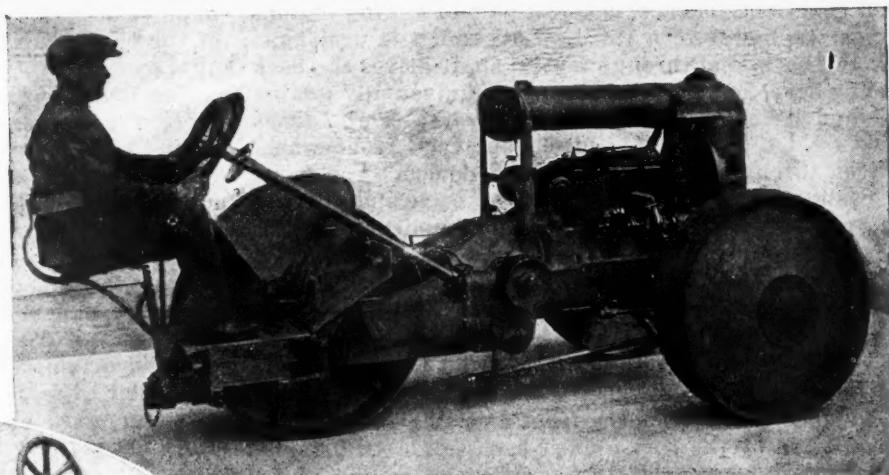
This Italian tractor was another of the several machines in the trials bearing outer resemblance to the Fordson, in that the engine, clutch casing, gear-set and back axle form a unit that removes the need for a separate frame. It is of the four-wheel two-track type, the front axle only being sprung. The four-cylinder engine has a bore and stroke of 105x180 mm. (4 $\frac{1}{8}$ x7 $\frac{1}{8}$ in.), the cylinders being cast in a block with the valves on the left; a large hand-hole cover plate runs almost the whole length of the top half of the crank case on the right. Ignition is by magneto and the water is circulated through the vertical tube radiator by pump. A multiple disk clutch, three-speed and reverse gear-set and worm-driven back axle comprise the transmission, the driving wheels being fitted directly to the live axle shafts. A plunger oil pump is operated by an eccentric from the differential case and forces the lubricant through a pipe from the bottom of the axle casing to the overhead worm. A bevel-driven pulley mounted on a short transverse shaft at the back of the axle casing serves also as a brake drum. The steering is of the Ackerman type, the gears being inside the transmission housing and lubricated by the oil therein. The weight of the tractor is 3,130 lb. The price could not be quoted in England at the time of the trials.

The Glasgow

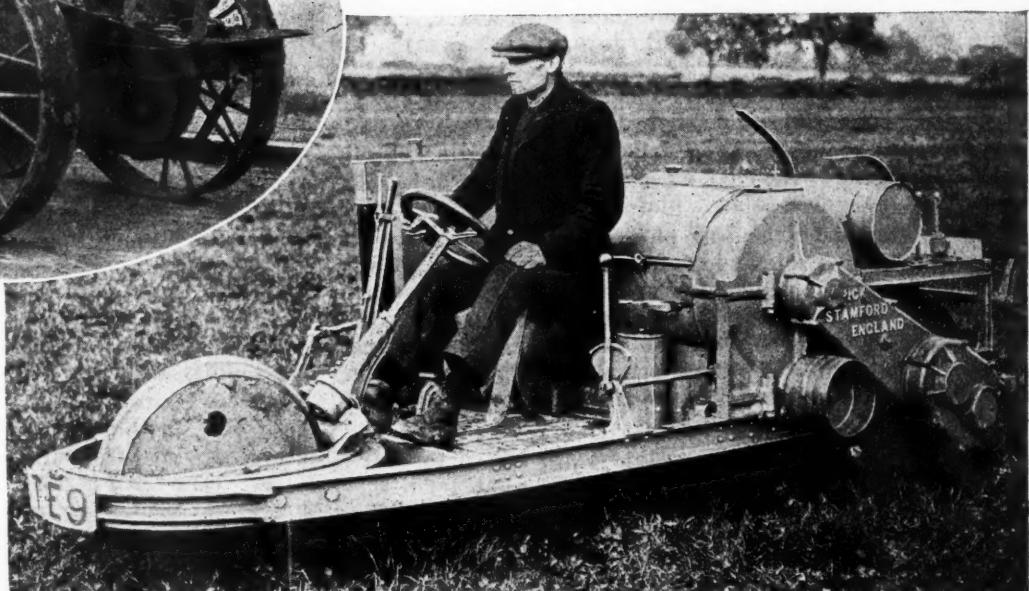
Without doubt this British machine represented the greatest novelty at the trials and aroused an unusual amount of interest among both agricultural engineers and farmers. It is of the three-wheel, three-track type; all wheels are driven and are of the same diameter, although the single rear wheel has a 12 in. face as compared with the 9 in. face of the two in front.

The drive is taken from the four-cylinder 4 $\frac{1}{8}$ x5 $\frac{1}{4}$ in. engine through an inverted cone clutch to a small pinion that meshes with a larger wheel on a layshaft in the in-

British Made Tractors



A close view of the all-wheel driven three-wheel Glasgow



The Crawley converted tractor was an interesting British design



The Pick, shown above, was one of the most interesting of the machines exhibited at Lincoln. It attracted wide comment. The Clayton is shown on the left

closed gear-box. Thence, one of a pair of sliding pinions conveys the power to a third shaft, which is prolonged front and back, and through a solid shaft drives the back wheel by bevel gearing, and through a universally jointed shaft and bevel gears the inner live axle of the front wheels. No differential is fitted, but each front wheel is driven through a ratchet and pawl device. The front axle casing is tubular and forked at each end for the steering swivels. These are in axial alignment with the center of the universal joints of the front wheel drive. The front wheel is dished so that the center line of the swivel produced passes down to the center of wheel contact with the ground.

The engine, clutch casing, gear-set and tubular extensions forming the rear wheel stays are assembled as a unit, which is mounted on the front axle at a single point and supported by the back axle at each side. Adjustable linkage occurs between the front axle and engine unit; when the tractor is plowing with one front wheel in the furrow, the linkage is adjusted to keep the engine unit vertical. The face of the rear wheel is concave to assist in stabilizing the superstructure.

Steering control is normal, by means of hand wheel, worm gearing and linkage, the worm gear being housed within the gear-box on the right-hand side, which is constantly lubricated by the oil thrown by the wheels. A transverse belt pulley shaft projects on the same side and is driven from a bevel gear wheel on the clutch shaft, the driven bevel being locked to the belt shaft by a dog clutch when required. The driver's pan seat is behind and on the right of the back wheel, with the control pedals standing up through a foot plate.

The following are leading particulars: Wheelbase, 72 in.; track, 52 in.; total width, 60 in.; total length, 10 ft. 9 in.; high speed, 5 m.p.h.; low speed, 2½ m.p.h.; reverse, 2¾ m.p.h.; weight, 3,600 lb. Wheel diameter, back and front, 3 ft. 3 in.; speed of belt pulley (normal engine speed), 1,200 r.p.m. The fuel normally used in the Zenith carbureter is gasoline, but the makers say they can arrange for kerosene if desired.

The drawbar consists of a steel plate bolted to rearward extensions of the tubular members that form the back wheel stays. It is arranged below the center line of the axle and may be adjusted laterally by a lever close to the driver to correct any side draught. Usually one of the front wheels runs in the furrow while plowing, the machine then being practically self-steering.

The price of this machine is £450 (\$2,250).

The manufacturers of this tractor have recently purchased from the British Government one of the National projectile factories at Cardonald, near Glasgow. This factory, which covers 12 acres of ground, will be used solely for the production of the Glasgow tractor (which, by the way, is sometimes known as the D. L.). The yearly output is planned at 5,000 machines, and the makers state that their entire production for the next five years has been sold—to a sales and distributing agency, probably.

The Martin Motor Plow

This is another British machine utilizing the chain track principle, although the makers also manufactured and entered in the trials the wheel type tractor referred to herein. The motor plow is a small self-contained machine, having the engine set well forward on the main frame, and balancing approximately the weight of driver and controls about the center of the chain track. The four-cylinder 4½x5½ in. engine operates on kerosene as fuel for normal running; it is fitted with a governor cutting at 1,000 r.p.m. and has magneto ignition with an

impulse starter. A tubular radiator is mounted in front of the engine, circulation being maintained by a centrifugal pump.

The drive is transmitted from the engine through a fabric-faced cone clutch and a pair of leather disk couplings to the gear-set which gives one forward and one reverse speed of approximately 2½ m.p.h. A main cross shaft extends through the sides of the gear-box and carries two sprocket wheels with dog clutches giving motion to the chain tracks. The engine clutch and the dog clutches of the cross-shaft are controlled by a single lever with lateral and longitudinal movements. The chain tracks take a triangular form in side elevation, looping over the driving pinion at the top and running around three idler wheels where contact with the ground is made.

The standard plow frames have three general purpose heads for plowing three furrows 8 to 9 in. wide by 8 in. deep; but a two-furrow "digging" plow for a 12 in. wide furrow 12 in. deep can be supplied. In both types a power lift is embodied whereby the plow can be raised and lowered when the driver depresses or releases a pedal.

The plow frame, which has a trailer wheel at its rear end, is detachable and can be replaced by a wheeled carriage to convert the machine into a tractor for cultivating, etc. Without this wheeled carriage the motor plow is sold at £400 (\$2,000) and weighs approximately 3,360 lb.

The Mann

One of the two steam tractors entered for the Lincoln trials, the Mann, is made by a firm which has for very many years past manufactured a steam road wagon with a load capacity of 5 tons. The tractor bears resemblances to the steam model and has leading features in common with the latter. It is of the four-wheel type, with the two front wheels set much closer together than the back ones, and is fitted with a compound engine with side by side high and low pressure cylinders, 4 and 6¾x8 in. The boiler, constructed for a working pressure of 200 lb. per sq. in., is of the locomotive type; the standard size is suitable for burning coal or coke, but a large firebox can be provided for burning wood if required.

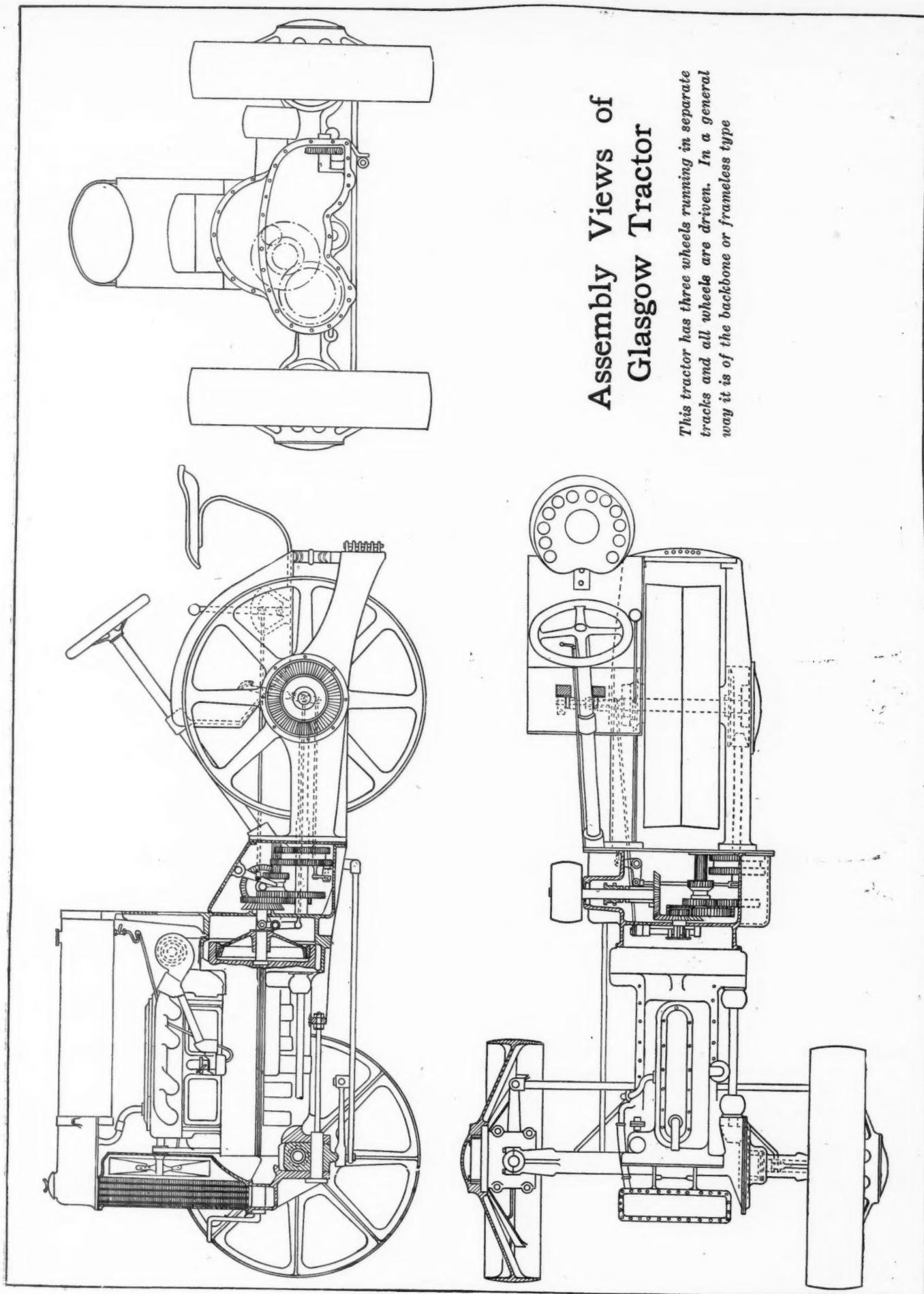
The water tank is said to be of sufficient capacity for half a day's plowing without replenishing. The need for carting water and fuel to the scene of operations is without doubt a point against the general adoption of the steam tractor, while its weight is another drawback; this, in the case of the Mann, is 4½ tons (11,080 lb.). Another point is that forty-five minutes are required to raise steam from cold. But as a road haulage tractor it appeals to British farmers more forcibly and, although it is not specially designed for road work, it is sprung fore and aft to fulfil British official requirements in this respect.

The transmission includes gearing giving three speeds forward and three reverse; the back wheels are 51 in. in diameter and have a 20 in. face, while the front wheels are 35x8 in. This steamer is sold at £825 (\$4,125).

Martin Tractor

This machine made its bow to the public at Lincoln, the makers previously having supplied only the Martin chain track motor plow, which also took part in the trials. The tractor is a four-wheel two-track type, spring-mounted as to both front and back axles, and fitted with a winding drum and belt pulley.

The four-cylinder engine (4½x5½ in.), the transmission details and the radiator are mounted on a channel steel frame; the clutch is of the cone type and conveys the drive to a two-speed gear box, thence by spur gearing to the rear wheels.



Assembly Views of Glasgow Tractor

This tractor has three wheels running in separate tracks and all wheels are driven. In a general way it is of the backbone or frameless type

The engine burns kerosene after starting on gasoline and develops 28 b.h.p. at 1,000 r.p.m. This machine, which weighs 5,260 lb., is sold at £450 (\$2,250).

The Pick

This tractor, which presents a design quite different from that of any other machine in the trials, was finished only a few days prior to the event. It has a frame triangular in plan with one 30x5 in. steering wheel, arranged in front in a circular turntable and operated through a semi-circular bevel-gear rack which engages with a small bevel pinion on the lower end of the steering column.

The driver's seat is on a platform at the front of the machine and has the four-cylinder 4 $\frac{3}{8}$ x5 in. engine arranged transversely behind it. The shaft of the cone clutch bears and drives a small spur pinion that engages a large wheel carrying the driving sprocket of a chain transmission to the gear-set. The latter is on the outside of the frame on the left, and has a side cover plate held by six studs and nuts. To change the gear ratio the cover plate must be removed. Two gears can then be drawn off their shafts (to which they are secured by dog clutches) and replaced by two others giving the desired ratio. Six different pairs of gear wheels are included in the standard equipment.

The driven gear wheel is mounted on an extension of the axle that supports and drives two disks or land wheels, 6 in. wide and 48 in. apart; but in plowing these two wheels are coupled by means of T section steel bars that have their single webs projecting outwardly and forming cross staves to give driving grip. The latticed roller wheel thus formed carries the entire weight of the engine and transmission and the rear part of the frame.

The plow is attached by a form of universal joint to a cross girder that is secured to the tractor by links; the latter in turn are pivoted about the outer extremities of the driving axle to allow a vertical movement at their rear ends. The cross-girder and, therefore, the plow frame is capable of being raised or lowered by a lever at the driver's right hand, and while the plow does not form a unit with the tractor it is attached to it directly by the universal joint referred to. The machine is to be sold at £550 (\$2,750); it is an interesting departure from normal types, but is as yet only in the experimental stage, for it was not showing up at all well on the second day's plowing—not from any defect in the principle of design but from over-heating of the engine and similar weaknesses that are quite capable of being overcome.

The Saunderson

This tractor represents one of the oldest and best known British makers of agricultural tractors and implements. It is a simple, straightforward job which, although it does not convey the "cleanliness" observable about the design of the Fordson, Fiat and Austin, for example, has its details arranged on the channel steel frame in very accessible positions.

There is very little about the Saunderson taken from motor car practice. The engine has two vertical cylinders with the crankshaft set across the frame; it is of the medium speed type, running normally at the governed rate of 750 r.p.m. Having a bore and stroke of 5 $\frac{1}{2}$ x8 in., the cylinders are separately cast and separately connected top and bottom to the radiator by large pipes for thermo-syphon circulation. The radiator, incidentally, is mounted on trunion supports and, after a toolbox carried at the front end of the frame has been removed, it can be swung forward and down, and rested on the main frame to provide greater accessibility to the engine, etc., from the front.

A half-compression device is provided for starting which is accomplished with gasoline as fuel, although with a special vaporizer having a throttle control for the exhaust gases, kerosene is normally used. From the leather-faced cone clutch the drive is taken by reduction gears to a three-speed gear-set providing speeds of 2, 3 and 5 m.p.h. and thence by way of a differential (provided with an optional locking device) and inclosed spur gearing to the rear wheels, the large gear wheel being bolted to the hub center of the right-hand wheel. The machine is of the four-wheel two-track type, the driving wheels being 48 in. in diameter and 10 in. wide, the steering wheels being 30x6 in.

The main frame is three-point suspended, resting on the center of the front axle with a single trunion bearing. A belt pulley, 12 in. diameter by 7 in. wide, is fitted at the outer end of the crankshaft on the right-hand side, and a winding drum is also provided by means of which a pull of 9,000 lbs. can be exerted.

The Saunderson tractor is on the heavy side compared with many others in its class, but it is designed essentially as a general purpose machine, for use on the road for hauling as well as for plowing, cultivating, threshing, etc. Its total weight unladen is 5,600 lb., of which 4,140 lb. is on the rear wheels. Its overall width is 66 in. and its length 144 in. The price is £510 (\$2,550).

The Weeks-Simplex

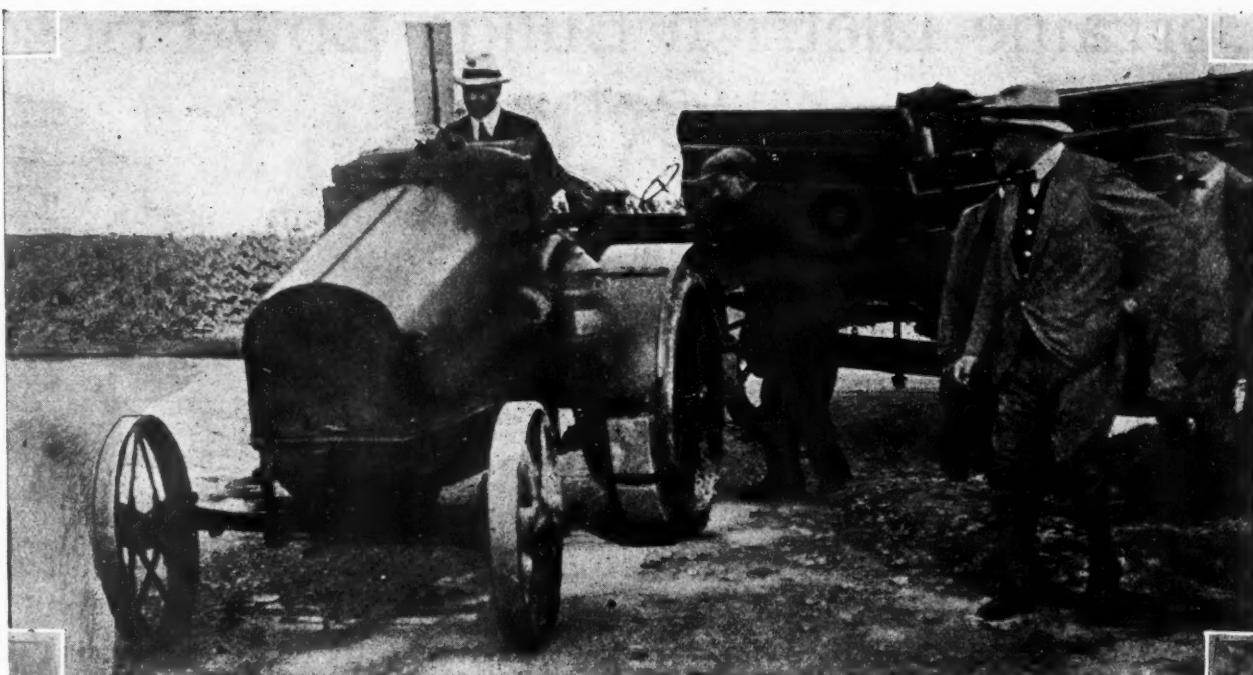
This four-wheel, two-track British machine is made by an old-established firm of agricultural engineers at Maidstone, Kent, the center of what has been termed the "garden of England," an important fruit and hop growing district, which has considerable areas, however, devoted to the production of grain crops. While in size this tractor resembles the Fordson and several other better known makes, it is not built on the unit system but has its engine and gear-set mounted on a channel steel frame, supported at a single point on the front axle.

The normal speed of the 4 $\frac{1}{4}$ x5 $\frac{3}{4}$ in. four-cylinder motor, which uses kerosene as fuel and has magneto ignition, is 900 r.p.m., at which rate the three-speed gear-set provides forward speeds of 1 $\frac{3}{4}$, 2 $\frac{3}{4}$ and 5 m.p.h., and a reverse of 1 $\frac{1}{2}$ m.p.h. A feature claimed as a merit lies in the lubrication of the engine. It is on the pump and trough system, but the dippers on the ends of the connecting rods are designed to be of the same capacity for discharging the lubricant from the troughs as the pump has for delivering it. Thus, it is said, the oil level in the troughs is constant at all speeds, for the rods dip in proportion to the speed of the engine and the pump capacity also varies directly with its speed of rotation. But, personally, the writer cannot see much of advantage in this arrangement as compared with the usual trough system; it would seem, in fact, to be conducive to over-oiling when the piston and rings become more or less slack by reason of wear.

From the gear-set the drive is taken by a leather disk coupling and bevel gearing to a countershaft. The latter is in halves united by a dog clutch that serves in lieu of a differential at headlands and sharp corners. The countershaft carries a spur pinion at each end engaging with internally cut gear rings bolted to the driving wheel spokes.

The following are some of the leading dimensions: Front wheels, 30 in. diameter by 10 in. face with a 1 in. wide center rim; back wheels 40x10 in., extension rings being supplied to increase the width to 15 in.; turning radius 10 ft.; overall width 48 in., without extension rings on driving wheels; length 108 in.; weight 3,700 lb. The price with usual equipment is £400 (\$2,000).

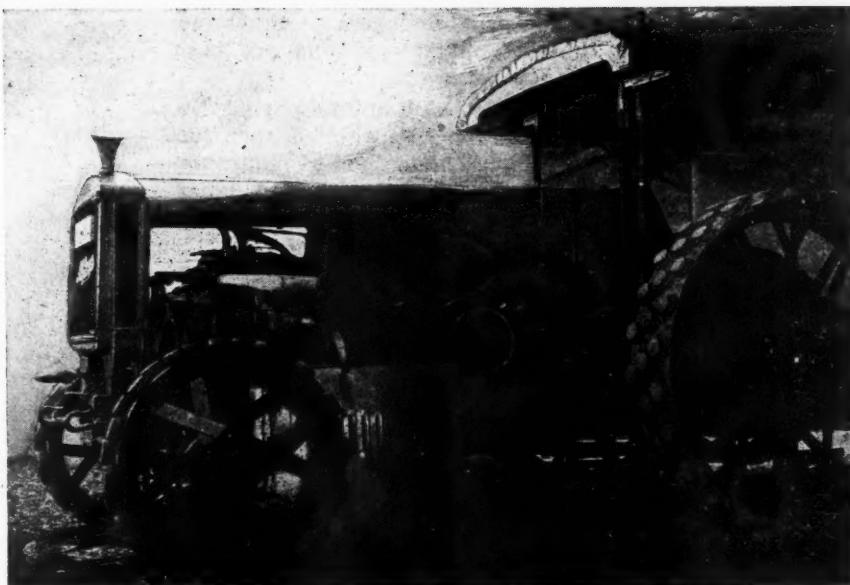
Studies In Tractor Wheels



This American machine had rectangular rubber pads on the driving wheels for the hill climbing test



Above is shown the Garner detachable cross strakes, which are riveted to three segments of an outer rim clamped to the wheel. A rubber tire and rubber pads are shown in the other two pictures



Lorraine Dietrich Builds Low-Priced Six Cylinder

This French company has designed a car for quantity production, the first such effort on the part of Engineer Barbarou. Lorraine has other extensive plans, including two high class six cylinder and one twelve cylinder model

LORRAINE DIETRICH has made an attempt to get into the low-priced car line with a new six-cylinder designed with economical quantity production clearly in view. The car is the work of Maurice Barbarou, who, until a short time before the outbreak of war, was chief engineer of the Delaunay-Belleville Co., and since then has had charge of the Lorraine Dietrich engineering department.

Barbarou has never previously designed a car with economical production as one of the primary considerations, but he has succeeded remarkably well in his initial attempt in this direction. The car has a six-cylinder engine of 75x130 mm. (2.95x5.12 in.), the cylinders being a single casting with valves mounted vertically in the head with operation by pushrods and overhead rockers.

The crankshaft is carried in four plain bearings attached to the upper half of a cast aluminum base chamber. The camshaft is driven by a helically cut pinion, and from the front end of this shaft the distributor is driven from a cross-shaft with helical gears. The cam-shaft is in the base chamber and operates the valves by long adjustable pushrods and overhead rockers, both of light construction. The exhaust valve is mounted direct in the head, but the inlet valve is placed in a bronze cage. There are two concentric springs for each valve, the stem of which is threaded and receives a nut holding the valve spring cup in position. Details of the rocker arms, springs and adjustment are the same as on the Lorraine-Dietrich aviation engines, but there is no overhead housing and no automatic system of lubrication. An ordinary greaser is provided for each pair of rockers. Connecting rods are short and tubular and the pistons are cast aluminum with five rings for each.

Lubrication is under pressure to all engine parts. No magneto is used, a Delco generator being relied upon for ignition, lighting and starting. The method of mounting is rather original. The generator is on the right-hand side of the engine, carried on a base cast with the crank-case, and has the water pump bolted to it. In the assembly the water pump is bolted to the generator and the two are placed on the engine together and held by one steel collar.

Engine Suspension

The engine has 3-point suspension to the frame, the ball and socket connection being to a channel section cross-member at the front. Bolted to the rear face of the engine base chamber is the combined clutch and gearbox housing, this being an aluminum casting of small overall length. There are three speeds and reverse, with constant mesh pinions at the rear, these being cut helical-

ly. The second gear is also helical. The first gear is of the ordinary spur type. The gearbox is a one-piece casting with open rear to which there is bolted a malleable casting receiving the housing for the sphere in the forward end of the propeller shaft. Gear-box construction has been enormously simplified with a view to cheap production. The two selector rods, for instance, are aluminum alloy die castings requiring no machining. The gear-box cover is stamped at one operation and the change speed lever is directly on the top of the box.

Axles and Brakes

The rear axle housing consists of two stampings welded together in a vertical plane and having front and rear sheet steel facings around the differential housing. There are distance pieces between these two. Roller bearings and helical bevel gear are used in the rear axle. The two brakes are side by side in rear wheel drums 17 in. in diameter. Cantilever springing is employed at the rear and semi-elliptic in front. Just behind the rear hanger of the front spring there is a stop which receives the end of the spring and prevents the axle moving backwards in case of spring breakage.

The frame members, which are 6 1/4 in. deep, are perfectly straight and parallel throughout their length. There are only three cross-members. The one at the front is channel section and carries the trunion attachment of the engine, and also on its forward face a double trunion for the radiator. The two others, which are placed at the center and at the extreme rear, are big diameter tubular members. The frame is reinforced at the spring attachments.

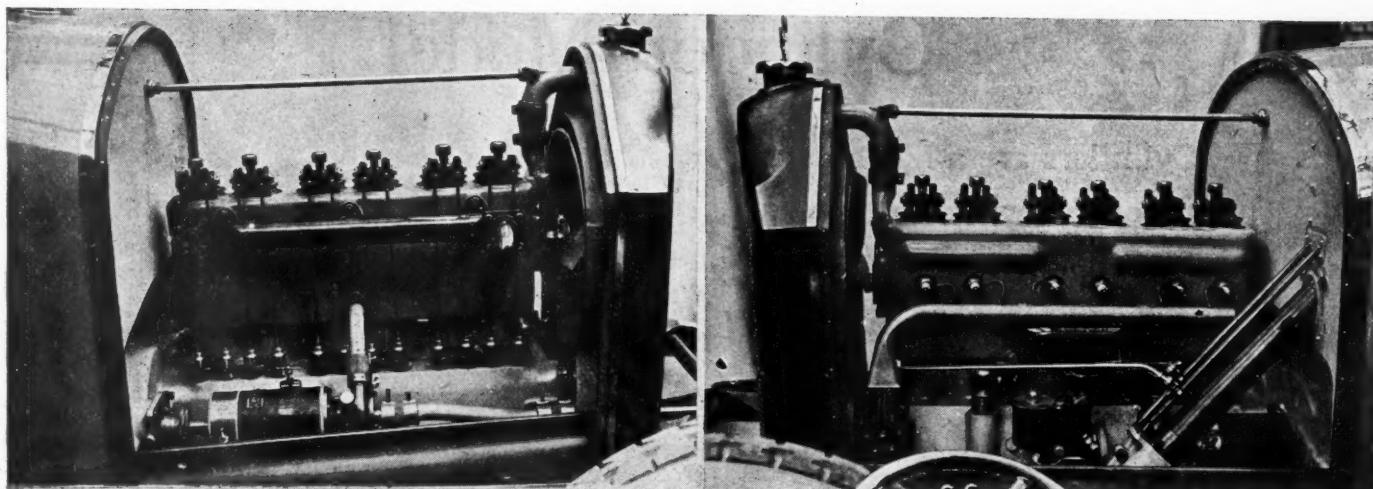
Fully equipped as a chassis, with five Sankey steel wheels, battery, tanks, radiator, etc., the weight is under 1,600 lb. The track is standard 56 in. with a wheelbase of 116.

Other Models Planned

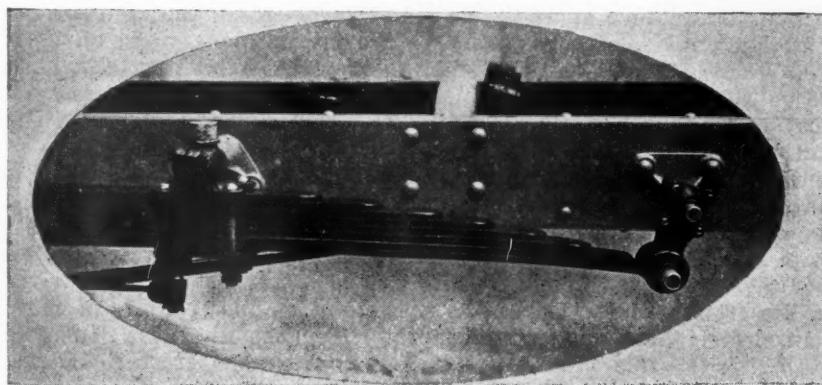
In addition to this low-priced car the Lorraine-Dietrich factory will produce two high-class six-cylinder models, followed by a 12-cylinder car at a later date. The engine dimensions of these are 3.15x5.90 and 3.54x6.30 in. for the six-cylinder models, and 2.75x5.50 in. in the cylinder engine. All these are high-class productions with quality as the first consideration.

The 3.15x5.90 in. six has detachable head with overhead valves operated by enclosed pushrods from a camshaft in the base chamber. The larger size six has a fixed head with valves on one side. The 12-cylinder engine has not been produced.

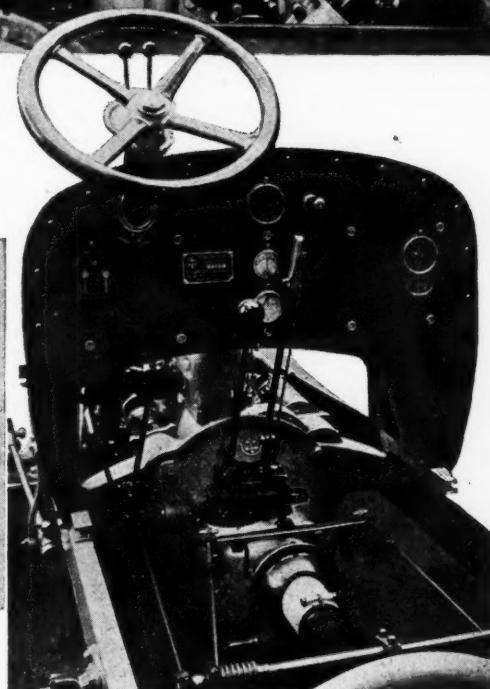
Details of the Lorraine Dietrich



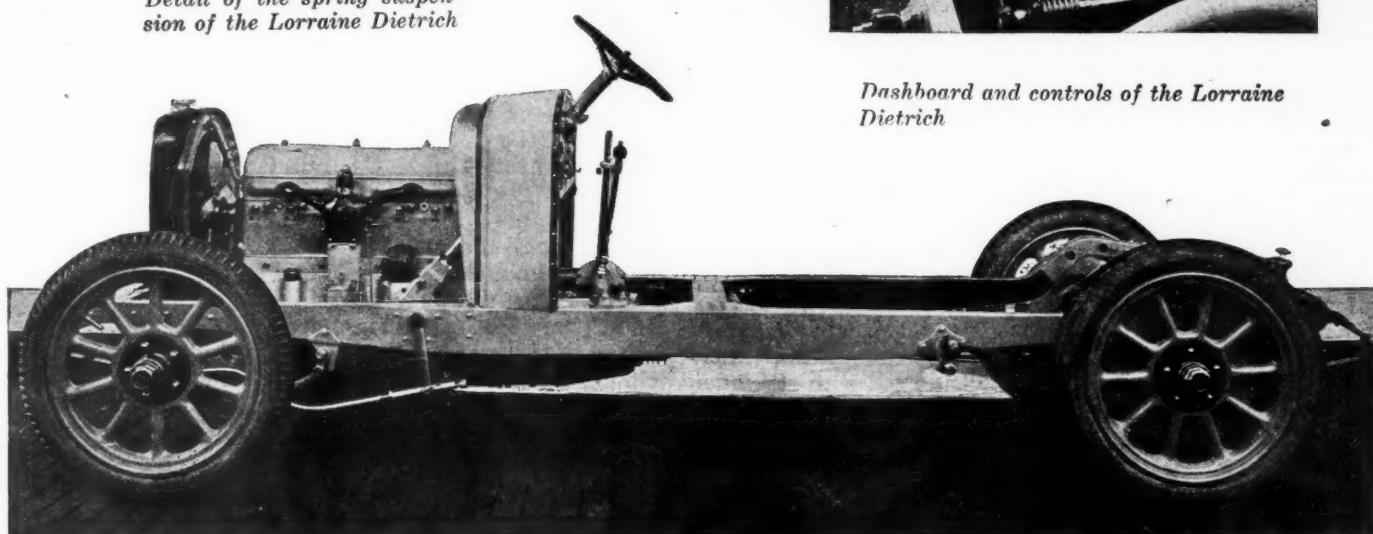
Right and left hand views of the low-priced Lorraine Dietrich engine



Detail of the spring suspension of the Lorraine Dietrich



Dashboard and controls of the Lorraine Dietrich



The Lorraine Dietrich six-cylinder valve-in-the-head model. This car is entirely new production and is the work of Engineer Barbarou

Lancia Produces a Novel Twelve Cylinder Model

Cylinders are a block casting with an angle of only 22 deg. between rows. An unusual type of suspension features this chassis, which has been under test for some two years

ATWELVE-CYLINDER engine of quite unusual design, mounted in a chassis with a novel type of suspension, has been produced by the Lancia Co. This appears to be the only 12-cylinder made in Italy and one of about four in Europe.

The outstanding feature of the Lancia Twelve is that the cylinders are a block casting with an angle of only 22 deg. between the two rows, one row being offset in relation to the other, so that the connecting rods are side by side. It is declared that world patents have been secured for this construction of offset cylinders and crankshaft with a small angle between the two rows of cylinders.

Lancia has adopted overhead valves and camshaft with a detachable head, the whole of the overhead mechanism being enclosed.

This construction gives an engine of practically the same length and width as a six of equivalent bore and stroke. Even after a close external examination most persons would pronounce the engine a six with double ignition. It is an absolutely clean block casting with no moving parts visible, no apparent exhaust pipe or manifold and no external piping. On the right-hand side is the carbureter, and on each side there is a row of plugs inserted at an angle of about 45 deg. Across the front is a short shaft driving a Dixie magneto and an electric generator.

The Lancia cylinders are a block casting without head. As revealed by an examination of the casting, the two rows of cylinders are considerably offset in relation to one another but, owing to the water jacket being common to the block, this offset is not apparent externally. The base of the cylinder barrels, which would reveal this offset, is covered by an aluminum plate. This is done only in order to form a continuous line from the top to the bottom of the engine. The effect is good, for it not only hides the cylinder barrels but also the holding down bolts. There is liberal water jacket space around the cylinders.

The block casting is mounted in the usual way on an aluminum base chamber. The detachable cylinder head carries the 24 vertical valves, thus being operated by a single camshaft and rockers. The valves are direct in the head, without cages. The cams run in individual troughs and, as the shaft is hollow and fed with oil under pressure, a constant level is maintained for both cams and rockers, independent of any inclination the engine may assume. With this construction valve springs can be changed merely on removal of the aluminum housing. To take out a valve the head must be dismounted, as on all detachable head engines.

The method of driving the camshaft, which is carried in four bearings, follows standard lines, being by an enclosed vertical shaft and bevel gearing. The shaft is in

two parts, with a screwdriver type connection, so that on taking off the head the upper pair of bevels and the upper portion of the shaft can be removed as a whole.

The whole of the space formed by the angle between the two rows of cylinders is occupied by the exhaust manifold, the exhaust thus being released at the rear end of the cylinder block, to which point the single exhaust pipe is bolted up. This arrangement adds wonderfully to the clean appearance of the engine, for, as the exhaust goes almost immediately under the dash, an observer might look a long time before discovering any trace of an exhaust pipe.

A dual Zenith carbureter with a single float is attached to a short intake manifold bolted to the cylinder block. All the gas passages are internal, one going to the left-hand and the other to the right-hand row of cylinders. Gasoline is fed to the carbureter by the vacuum system.

Pump and Feed

Cylinder dimensions are 80 by 100 mm. (3.15x3.94 in.). The crankshaft has a bearing between each pair of cylinders. Connecting rods are I-section and pistons are aluminum. The vertical shaft which operates the overhead camshaft also drives a cross-shaft that drives a Dixie 12-cylinder magneto at engine speed from one end and an electric generator from the other end. Just below this cross-shaft is a helical gear operating the water pump. Immediately on leaving the pump the inlet water pipe runs through the crankcase and emerges near the rear end on the right-hand side, there thus being a short external length of inlet water pipe from the base chamber to the water jacket. There is a single return from the top front end of the cylinder block to the radiator.

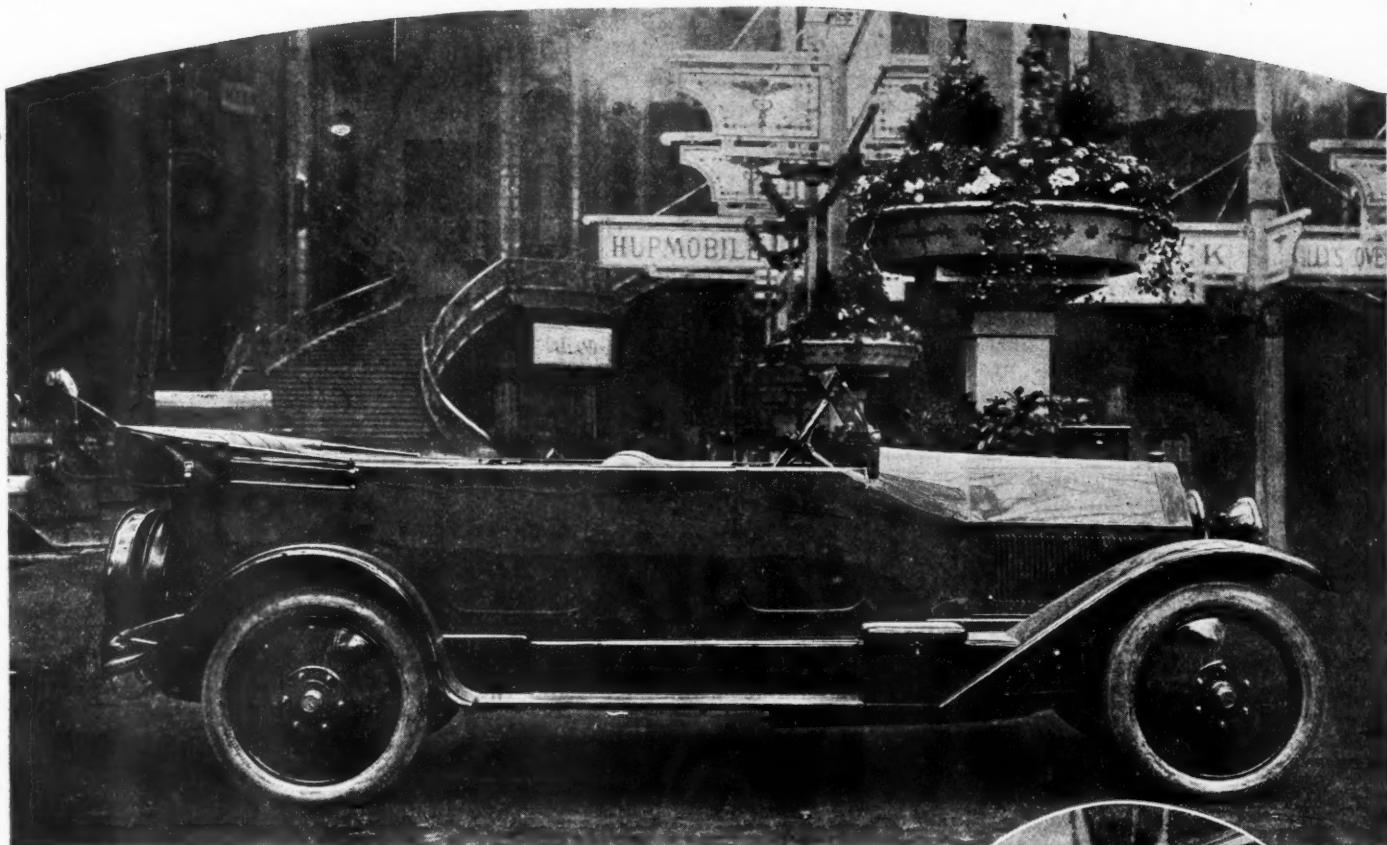
Force feed lubrication is employed, with the oil pump driven off the extremity of the vertical shaft. The throttle is connected up to the relief pressure valve, so that when full gas is given the whole of the oil delivered by the pump goes to the bearings, none being allowed to pass through the relief valve.

The Lancia engine is mounted on the extended webs of the frame members, there being no subframe and no underpan. The combined clutch and gearbox housing is bolted to the rear face of the engine base chamber. This aluminum casting forms two compartments, each with its separate detachable cover plate. The clutch is the multiple disk type. There are three speeds and reverse, with the change-speed lever and the hand-brake lever mounted on top of the box, consequently being operated by the left hand. As on other Lancia models, the constant mesh pinions are at the rear of the box, and with the car standing no gears revolve.

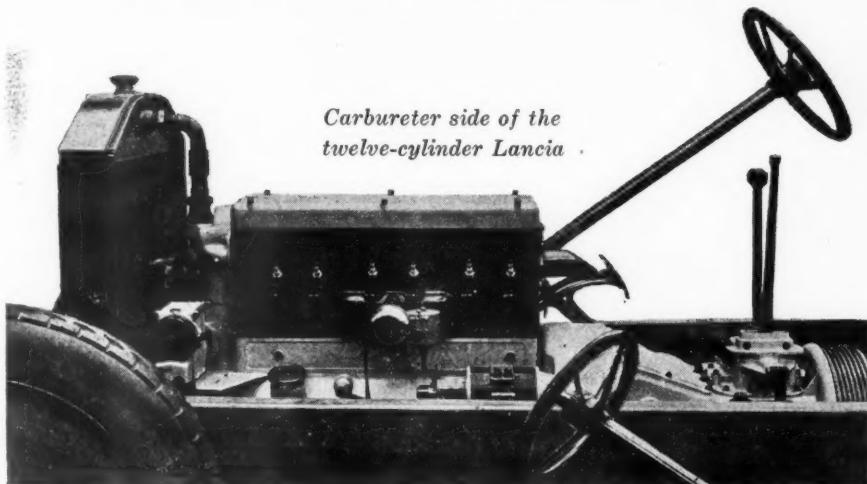
The separate torque member has been abolished. The

(Continued on Page 864)

The Twelve-Cylinder Lancia



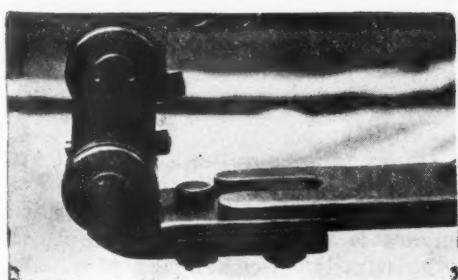
The Lancia with Michelin steel disk wheels



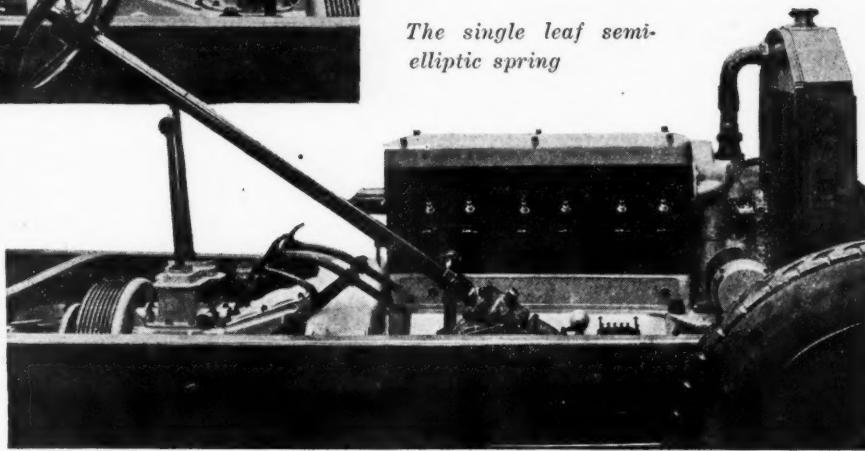
Carburetor side of the twelve-cylinder Lancia



The single leaf semi-elliptic spring



Forward end of cantilever spring bolted to special type of shackle



Lancia twelve-cylinder in one casting with cylinders at 22 deg.

Piccard-Pictet Produces an Eight and a Four

A single sleeve valve engine features the car made by this Swiss firm which now builds in France. Front wheel brakes have been added to the hand brake on the transmission

PICCARD-PICTET, a Swiss firm now building cars in France, is producing two models with a single sleeve valve engine. One is an eight and the other a four-cylinder. The eight is a high-class product with 3.34x5.12 in. cylinders, mounted in two blocks of four at an angle of 60 deg. The single sleeve Argyll type of distributor, modified by Piccard-Pictet, is used. The exhaust collector is on the outside of each block. All other engine accessories are in the angle formed by the two blocks of cylinders. A single shaft, driven by chain from the front, operates the water pump, magneto and electric generator, placed in the angle of the cylinders. At the front end of this shaft there is a four-blade aluminum fan which is mechanically operated. A friction clutch allows this fan to be thrown out of engagement when desired.

The base chamber is dry, all oil being contained in

a tank on the forward face of the dashboard and sent under pressure to the bearings. On falling into the base chamber the oil is collected by a scavenging pump and returned to the tank. This system has been employed on various racing cars, but this appears to be the first occasion on which it has been used on a touring model.

A single Zenith carburetor is employed. It is mounted high in the angle between the two rows of cylinders. The bottom of the float chamber is practically level with the top of the cylinders. Gasoline is brought to the carburetor by the vacuum system.

Piccard-Pictet has adopted front wheel brakes, in addition to a hand brake on the transmission. The car is fitted with all known accessories, including power-driven tire pump, 8-day clock, electric starting and lighting, barometer, revolution counter, compass, extra air inlet, etc. All fittings are nickel-plated.

The Novel Lancia

(Continued from Page 862)

propeller shaft is inclosed and the drive is taken through the spherical end of the shaft housing, which is received in the corresponding female housing on the rear of the gear-box.

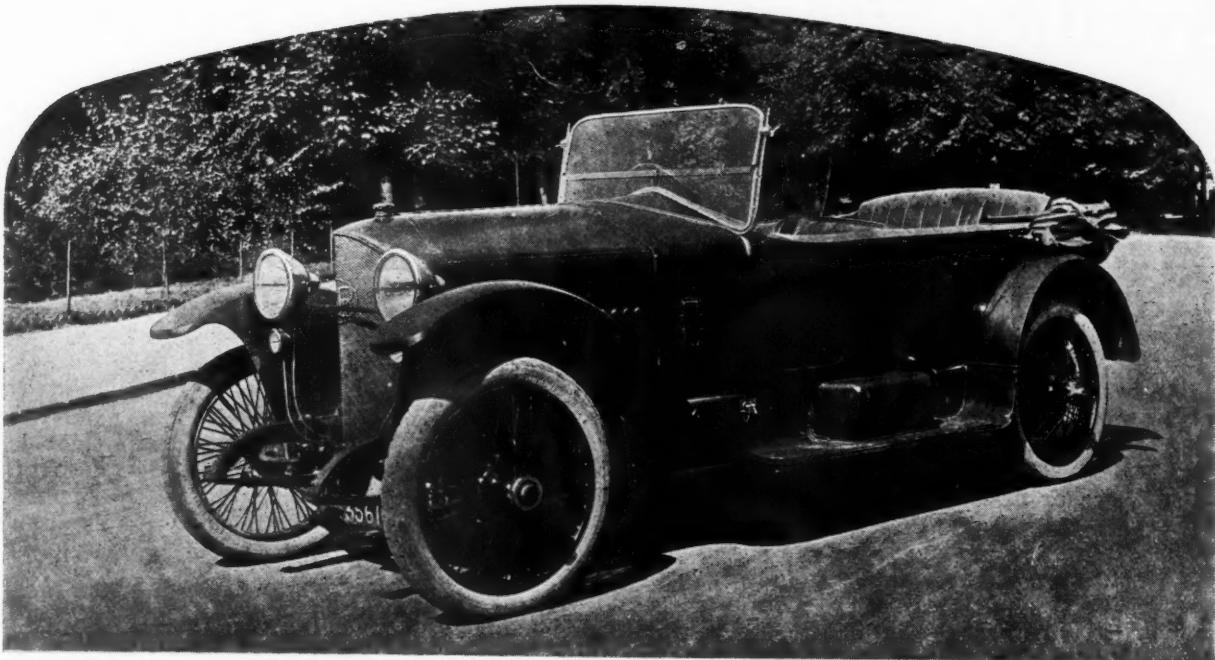
Double Springs

Suspension is quite special and is the subject of patents. It consists of a combination of cantilever and semi-elliptic, but the latter comprises only one leaf, the width of which is 4 in. at the axle end and 2.8 in. at the shackle end. The cantilever is placed directly under the frame member and also under the axle. The center and the forward attachments are normal, but at the rear there is an unusual type of elastic suspension between the end of the spring and the axle housing. This is obtained by a short, heavy steel cable with hardened spherical ends, one of which is received in a socket on the axle casing and the other in a similar socket on the spring end. So far as the cantilever is concerned, there is free movement between the spring and the axle. The semi-elliptic, however, provides the rigid connection. This spring is not a single length, but is divided into two parts, one of which is bolted to a seating just to the rear of the axle tube and the other to a corresponding seating ahead of the tube.

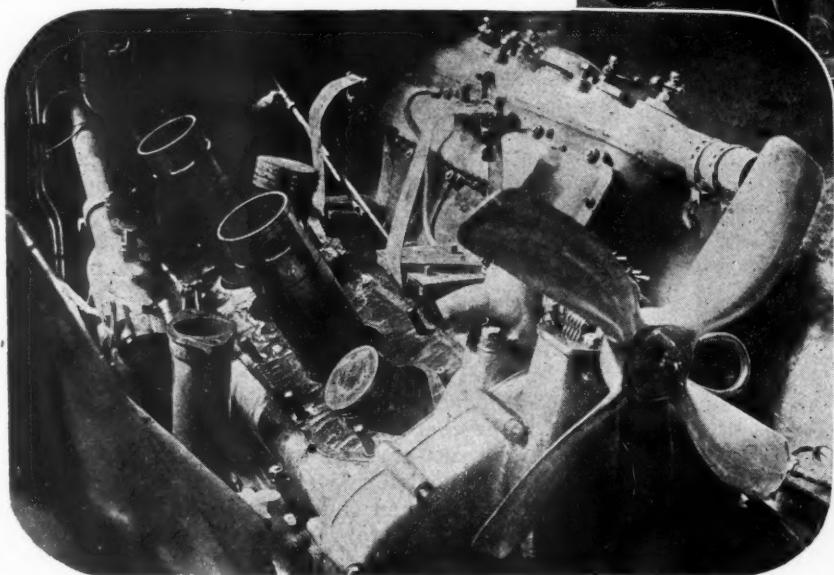
There are no spring eyes on this car. The main leaf of each spring is drilled with two or three holes and is bolted to a special type of shackle which is bushed in both a horizontal and a vertical plane and is provided with a spring for automatically taking up wear that may result from lateral movement. Big wearing surfaces are obtained with this type of shackle and adequate lubrication is obtainable. In the case of the rear attachment of the front springs, there are oil cups inside the hood from which oil flows to the entire shackle. When wear takes place the entire shackle can be removed and replaced without removing the springs. The old shackles can then be bushed and are as good as new. This feature of the car is the subject of patents.

The advantages of the Lancia suspension are that the cantilever is free to operate as a spring only and does not have to transmit either drive or torque. The single-leaf cantilever not only serves to anchor the axle but it acts as a supplementary suspension. When running with only one passenger the semi-elliptic acts as a spring. When a full load of passengers is carried the semi-elliptic is flattened and only the cantilever comes into play. Experiments have been carried out for two years on a big touring car for nine persons. This car was as easy riding with a driver and only one passenger at the rear as with its full load of nine.

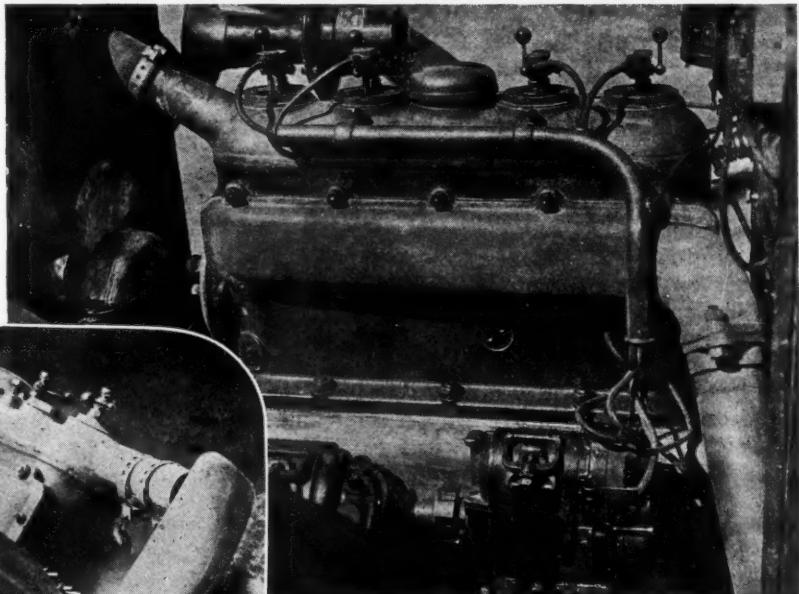
The Piccard-Pictet Model



The Swiss firm of Piccard-Pictet has come out this year with two models, one a four and the other an eight. Both models are featured, in addition to the engine and power unit, by front-wheel brakes.



The Piccard-Pictet eight has an engine of 3.34 x 5.12 in. dimensions, in which the single sleeve Argyll type of distributor, modified somewhat, is used. The eight is mounted in two blocks of four cylinders each, set at an angle of 60 deg. This engine attracted wide attention at the recent Paris show, where it made its initial exhibition.



The picture above shows the left side of the four-cylinder engine of the smaller Piccard-Pictet model. The larger model, which is shown to the left, has the accessories mounted in the angle formed by the two-cylinder blocks. A single shaft, driven by chain from the front, operates the water pump, magneto and electric generator. A four-blade aluminum fan is used.

Aviation Practice Features Farman Six Cylinder

This company, composing Henry and Maurice Farman, have developed an engine with vertical cylinder developing 85 h. p. Construction is under way in factory built during the war for making the Lorraine Dietrich airplane engine.

HENRY AND MAURICE FARMAN, pioneer aviators and the largest airplane manufacturers in France, have come on the market as automobile manufacturers. Their first car, which was exhibited at the Paris Salon, is a high-class 40 h.p. six-cylinder with valves in the head.

Aviation practice has been followed throughout in the construction. Every effort has been made to produce a good machine with cost almost a secondary consideration, for the selling price of the complete chassis with all accessories is \$9,000 at nominal exchange.

The Farman Brothers are old motorists who had the biggest selling business and the largest garage and car hiring organization in France before they turned their attention to aviation. During the war, they erected a modern factory for the production of the Lorraine Dietrich aviation engines. It is this factory, designed, equipped and organized within the last three years, that is being used to produce the Farman car.

The engine is of the aviation type with six vertical cylinders of 100x140 mm. (3.94x5.50 in.), developing 85 h. p. The cylinders are a steel barrel with separate head screwed and welded in position. The six separate cylinders are united in a block by being welded to a sheet metal base plate; they are also united near the head by a welded on plate connecting the six inlet and the six exhaust ports. Around the block thus formed there is welded a sheet metal water jacket common to the entire engine. The result is that the engine has the compactness and rigidity of a block casting, together with a completely machined combustion chamber and low weight. Compared with a blockcast engine of equal piston displacement, the Farman weighs 110 lb. less.

The cylinders are mounted on an aluminum base chamber that carries a three bearing crankshaft. There is a vibration damper at the front and a steel flywheel at the rear. The overhead camshaft is driven by a vertical shaft and bevel gearing, the whole of it being inclosed in an aluminum housing. The valves are vertical in the head and operate in long guides, the control being by intermediate rocker arms. The whole of the overhead valve mechanism is enclosed by a quick detachable aluminum housing making an oil-tight joint with the cylinder head. Connecting rods are I-section and have attached to them aluminum pistons. Lubrication is under pressure to all parts, including the overhead valve operating mechanism, from which there is a return to the base chamber.

A transverse cross shaft at the foot of the vertical shaft drives the high tension magneto from one end and the water pump from the other. Also from the vertical shaft, there is driven a four-blade cast aluminum fan, with a friction clutch between it and the driving member.

The fan can be thrown out of engagement from the driver's seat, by operating a lever on the dashboard. As there is an aviation type distance motometer on the dash, the driver has accurate control over the temperature of the water. This temperature is not taken from the radiator but from the outlet from the cylinders, as in aviation practice.

Double ignition by high tension magneto and by generator and coil has been adopted. There are two sets of plugs, mounted just below the valves on opposite sides. The magneto is a high-tension S. E. V., and the electric generator is of the same make. The two ignitions appear to have been adopted primarily to assist in securing an easy start. They are synchronized, however, and can be used either together or separately. Starting is in the ordinary way, by means of a separate electric starting motor mounted on the right-hand side of the engine base chamber and having its pinion engage with a ring gear on the flywheel.

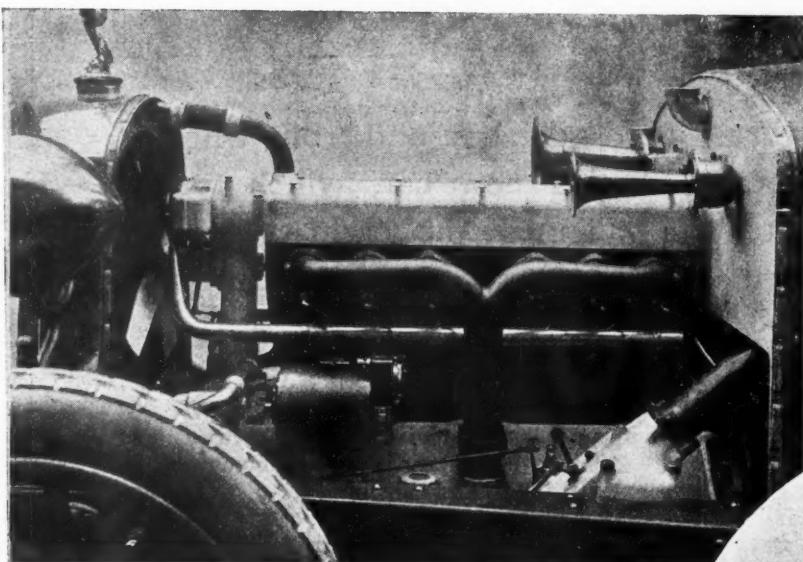
The exhaust manifold is a straight length of pipe running before the six ports. From the center portion of its length, the exhaust pipe is carried down through the crankcase and from it there is carried an internal hot-air muff to the carburetor air intake on the opposite side of the engine. A vertical Zenith carburetor is used, but aviation practice is followed by fitting a dashboard adjustment for hot and cold air as well as a device for shutting off all air for starting. The European tendency is to give a big gasoline tank capacity. On the Farman there are two tanks, one being at the rear and the other in the scuttle dash, the total capacity being 42 U. S. gal. By the vacuum system, gasoline at the rear is brought up to the dashboard tank and flows from there to the carburetor by gravity.

The entire power plant is carried on a special type of subframe, but unit construction is not adopted. There is a four-speed gearbox with a universal between it and the cone clutch. The change speed lever and the hand brake lever are in the center steering being on the left for French clients. Provision is made, however, for fitting right-hand steering when the cars are sent to England. Helical gears are used for the constant mesh pinions with a view of reducing noise, with ball bearings to take the thrust of these gears. All the shafts in the gearbox are mounted in roller bearings, and the gears are nickel steel, case hardened and heat treated.

There is an oil pump in the gearbox which delivers lubricant to the universal joint. An oscillating type of rear axle is used with enclosed propeller shaft, the forward end of the housing forming a sphere which is received in a corresponding casing on the rear of the gear-

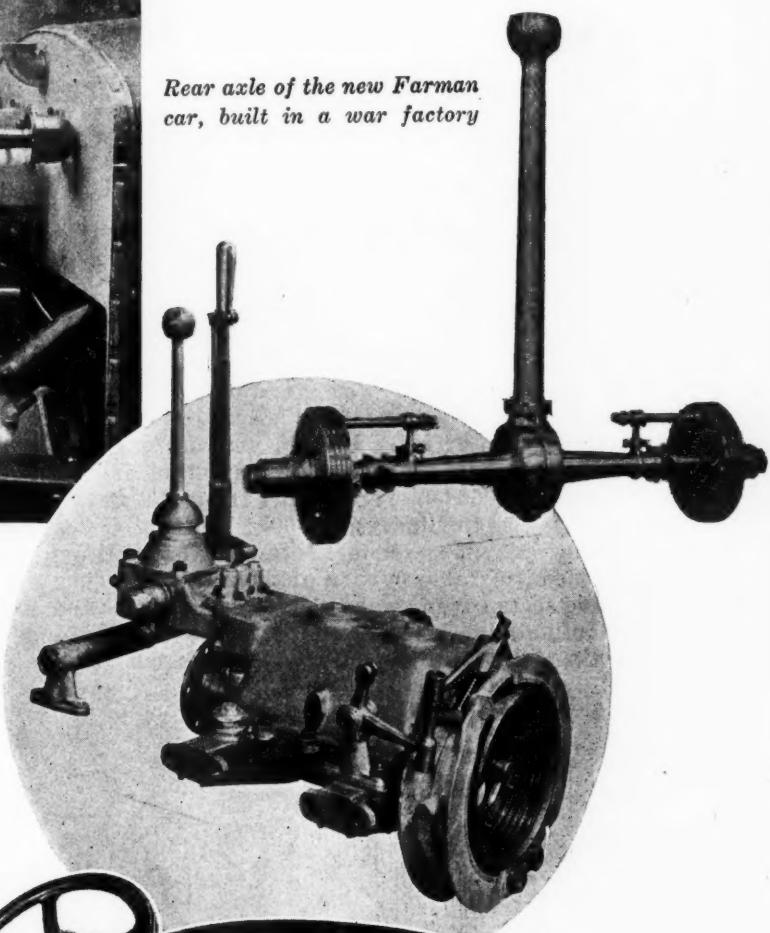
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The Six Cylinder Farman

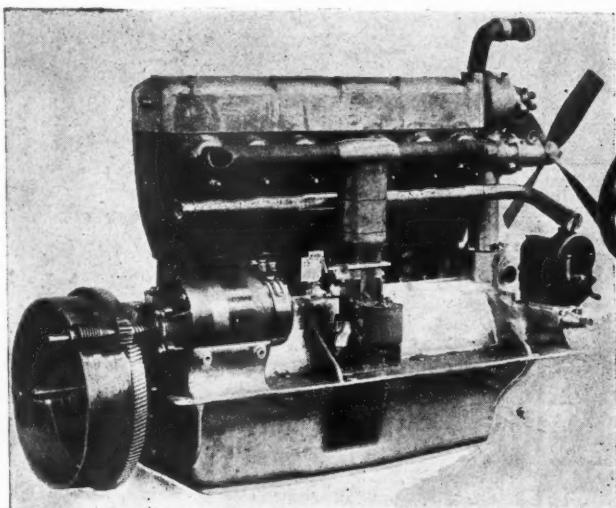


The Farman Six

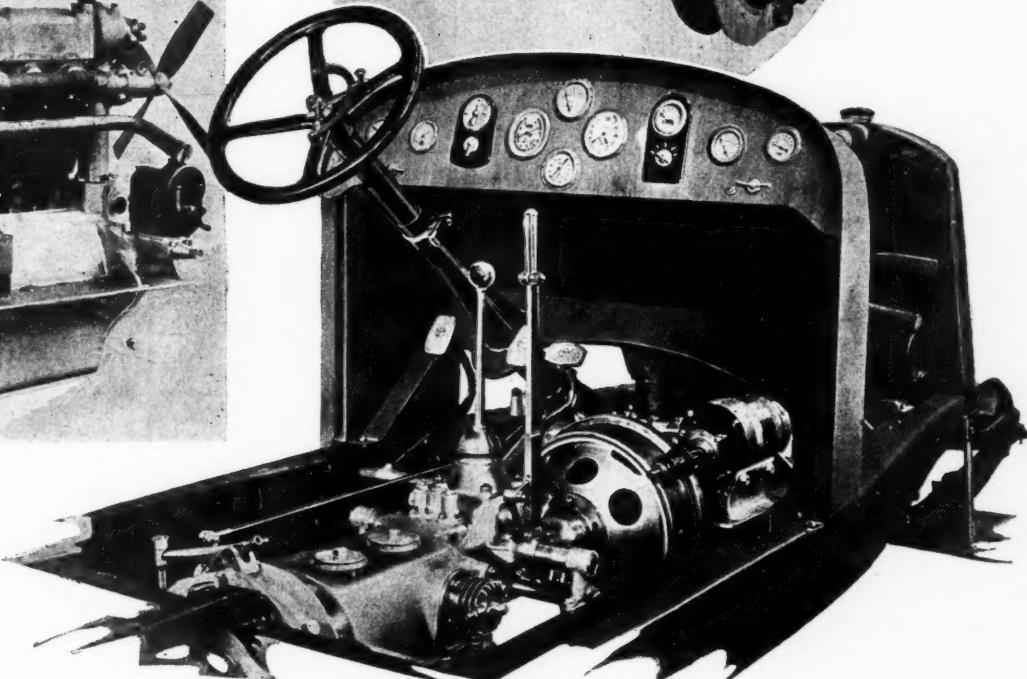
Rear axle of the new Farman car, built in a war factory



Construction details of the Farman



Aviation practice has been followed throughout the construction of the Farman engine



The six-cylinder Farman with left-hand drive

High Priced Six Cylinder is New Hispano-Suiza Model

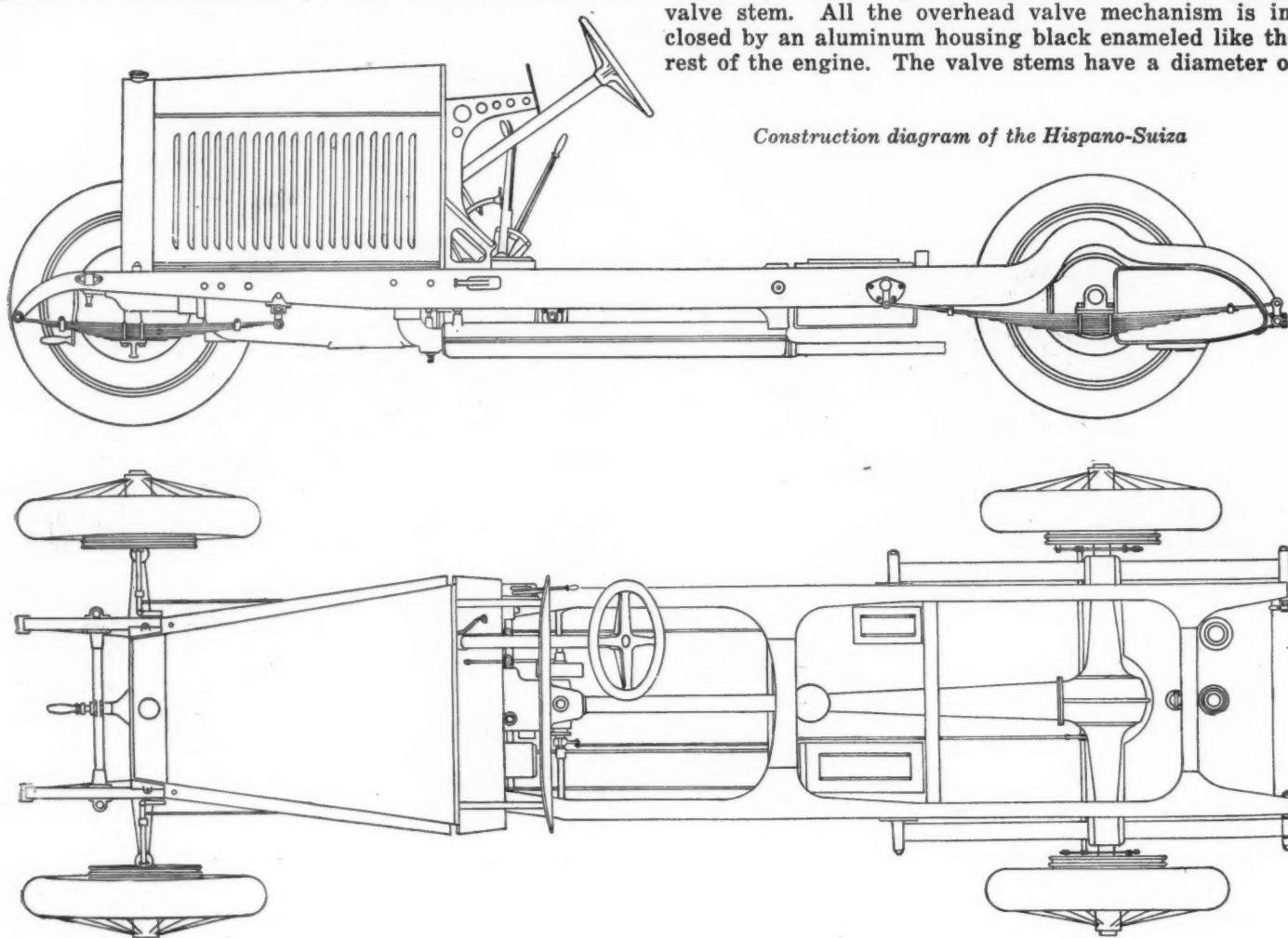
An aviation type engine, three speed gear box and front wheel brakes are construction details of this new car, which was designed by Marc Birkigt, who planned the eight-cylinder Hispano-Suiza aviation engine employed so generally during the war.

HISPANO-SUIZA is concentrating for 1920 on a high-class six-cylinder car with aviation type engine, three-speed gearbox and front wheel brakes. This car is the production of Marc Birkigt, who designed the eight-cylinder aluminum Hispano-Suiza aviation engine, of which more than 50,000 were built during the war.

The car engine has cylinders of 100 x 140 mm. (3.94x 5.52 in.). They are separate steel forgings, threaded externally for a considerable portion of their length. They have the valve seats cut in the head and they are screwed into a cast aluminum housing which forms the water jacket for the entire group. The block is black stove

enameled by a patented process with a view to eliminating any possible porosity and as a protection. Incidentally it improves the appearance considerably. In all the essentials, the cylinder construction for the car engine is the same as for the aviation motor. One detail change is that a portion of the aluminum water jacket on each side is detachable and, with the exception of the two end ones, the holding down nuts are inside the water jacket, instead of being external.

The valves are vertical in the head. There are two per cylinder, and are operated direct by an overhead camshaft, without any follower between the cam and the valve stem. All the overhead valve mechanism is inclosed by an aluminum housing black enameled like the rest of the engine. The valve stems have a diameter of



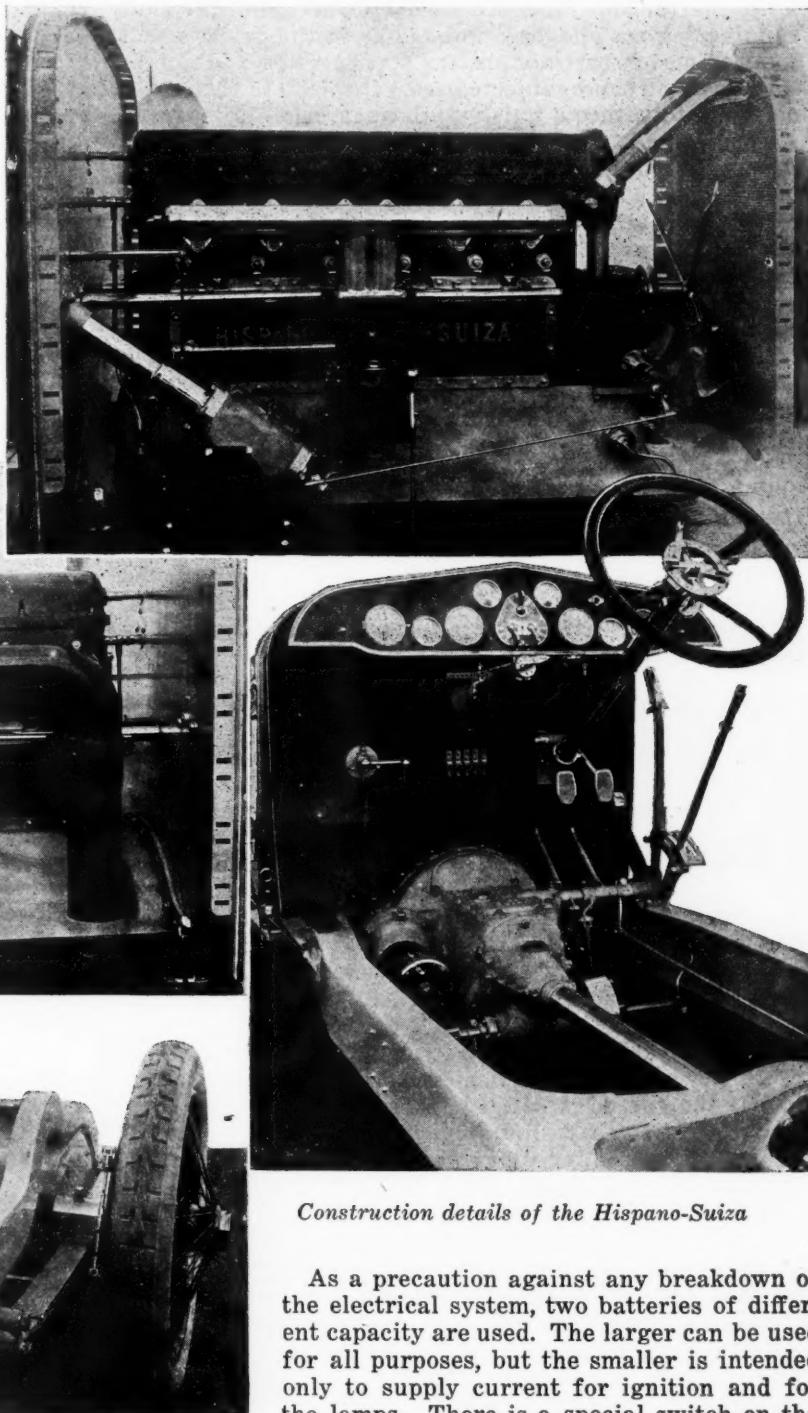
Construction diagram of the Hispano-Suiza

16 mm. ($\frac{5}{8}$ in.) are hollow for the greater portion of their length. They are made of a very high grade of tungsten steel.

The crankshaft is of large diameter. It is specially counterweighted and is carried in seven white-metal lined bearings. The design calls for a considerable amount of machining, the forging weighing 600 lb. and being reduced to 35 lb. Connecting rods are tubular and have attached to them aluminum pistons with three grooves, each one receiving a narrow double ring. The piston pin is also of large diameter; it is hollow and is free to revolve both in the piston and in the rod. To prevent scoring of the cylinder walls an aluminum cap is fitted over each end of the pin.

A hollow crankshaft is employed. It is carried in seven plain bearings and is driven by an inclosed vertical shaft and bevel gearing at the front of the engine. From the vertical

and driven off the vertical shaft. Each distributor supplies current to six spark plugs, there being two sets mounted horizontally, to left and right, below the valves.



Construction details of the Hispano-Suiza

shaft there are driven two distributors, the water pump, and an air pump.

The Electric Equipment

The engine has no magneto. Instead, a special Delco generator is used and is mounted in a cylindrical housing on the front of the engine and driven off the front end of the crankshaft. This position places the generator just below and slightly behind the radiator.

The housing is split, with the two ends brought together by a bolt, and can be drawn out on the removal of this bolt without touching any other part. There are two separate distributors, placed just behind the radiator

As a precaution against any breakdown of the electrical system, two batteries of different capacity are used. The larger can be used for all purposes, but the smaller is intended only to supply current for ignition and for the lamps. There is a special switch on the dashboard which makes it impossible for the smaller battery to be brought into service for anything but ignition and the side lamps.

The electric starting motor is mounted on the left-hand side of the gearbox and engages with a ring gear on the flywheel, in the usual way, through the intermediary of a reducing gear.

Lubrication is under pressure to all parts except the piston pins. The oil is taken up to the hollow crankshaft, passing through it to all the rockers and the cams and is returned to the base chamber by an overflow from each end.

The carburetor is built by the Hispano-Suiza company, but embodies certain jet features of the Solex (under license). It is mounted on the right-hand side of the en-

gine and is connected up to a single horizontal pipe running before the inlet ports. The intake manifold is an aluminum casting machined inside and out and enameled internally to an absolutely glass-like finish. The choke tubes are variable from the steering wheel, and the slow running jet can also be regulated from the driver's seat so as to enrich the mixture for starting. In addition to this, gasoline can be injected from the dash to the intake manifold to assure a quick start when cold.

The design has been so worked out that all hot air from the engine must be expelled laterally through the louvres in the hood. The dashboard is a compound structure, formed of aluminum, asbestos and three-ply wood. It hermetically seals the engine housing, for at the base it fits close to the crankcase and, although the steering gear and the throttle controls have to pass through it, the openings are absolutely airtight.

Hispano has maintained the pre-war design of rigid attachment of engine to side frame members, so that the engine stiffens the frame. On this account there is no sheet metal underpan. Instead of the open well for the flywheel, however, everything is now inclosed and the clutch housing and gearbox are bolted to the rear face of the engine basechamber to form a unit construction.

The actual horsepower obtained from this engine has not been stated. The compression is lower than on the aviation engines, being only 4.16 kg. (59 lb. to the sq. in.). The engine is free from vibration and, on the bench, has been run up to more than 3,500 r.p.m.

Three Gears Only

Because of the high ratio of power to weight, it has been decided to provide only three gears instead of four. The clutch is multiple disk type with asbestos fabric facing.

Hotchkiss drive has been abandoned. Semi-elliptic springs are used at the rear, their dimensions being 60x3 in. They are shackled at both ends. Drive is by an enclosed propeller shaft, terminating in a sphere at its forward end. Instead of the attachment being made to the back of the gearbox, as is the general practice, with the result that a long propeller shaft has to be employed, the frame member of the sphere is mounted to the rear face of a heavy central cross-frame member. The female member of the sphere is carried in ball bearings with horizontal axes, so that all movements of the axle in a vertical plane in relation to the chassis are taken care of by the ball bearing. The sphere takes up the movements of the axle in any direction.

With this design, the propeller shaft is in two parts. The forward portion from the clutch to the cross-frame member has a universal at each end. The rear portion is enclosed in the tubular housing bolted to the rear axle. A full floating and oscillating type of axle is used. It is formed of two forgings bolted together in a vertical plane. Helical bevel gears are used.

Four-wheel brakes have been adopted. The drums, which are $15\frac{3}{4} \times 2\frac{3}{4}$ in., are cast aluminum, with radiating fins and steel liners. The brake shoes are cast aluminum, with steel facings where the operating cams make contact. The flasks covering the brake drums are also aluminum castings, this metal having been adopted to eliminate all noise when running over paved roads.

One of the most interesting features of the braking system is the patented method for employing the momentum of the car to apply the brakes. The practical result of this is that, with a light touch on the brake pedal, a touch no heavier than is necessary for the accelerator, the brakes can be applied vigorously. Immediately behind the gearbox there is a cross-shaft,

driven by helical gears and running at 1/64th engine speed. This shaft has mounted on it a 5 in. brake drum, which is always in motion when the car is under way. Passing through this hollow shaft is the main shaft carrying the brake levers and also having brake shoes, which, on the pedal being depressed, come in contact with the revolving drum. When contact is made between the shoes and the drum, this latter carries round the former, and also the shaft with its levers to which the shoes are attached. To apply the brakes, therefore, there is no direct leverage, but frictional contact between shoes and a drum driven from the main shaft. If for any reason this system should fail, direct leverage is obtainable in the ordinary way.

The pedal operates all four brakes. There is a hand lever, however, which applies the rear wheel brakes only, and is used not only for holding the car in a standing position, but as an emergency if the pedal control should break. Although operating simultaneously, a failure of the rear brakes does not incapacitate the front, and vice-versa.

Steering is by screw and nut, with the gear contained in an aluminum housing and a specially big cover being fitted to lubricate. The main steering levers, which are generally tapered and keyed to the steering pivots, are, in this case, bolted in position, and the main lever on the right is in a single piece. The stub axles are of unusually big diameter and are hollow.

Instruments are all mounted on a polished aluminum dash. These comprise revolution counter, speedometer, oil and gasoline gages, distance type motometer, gasoline hand pump and pump for injecting gasoline into the intake manifold.

Spring shackle bolts are lubricated by oil. A flexible ended oil gun with a taper nozzle is supplied with each car and will fit every shackle bolt and every greaser not provided for automatically. The shackle bolts are fitted with quick detachable spring caps that cannot be lost and prevent dirt and water from entering. Detachable wire wheels are the standard equipment, the tires used being 935x135 mm. (37x5.3 in.). Wheelbase of this car is 145 in. and track 56 in.

The Farman Six Cylinder

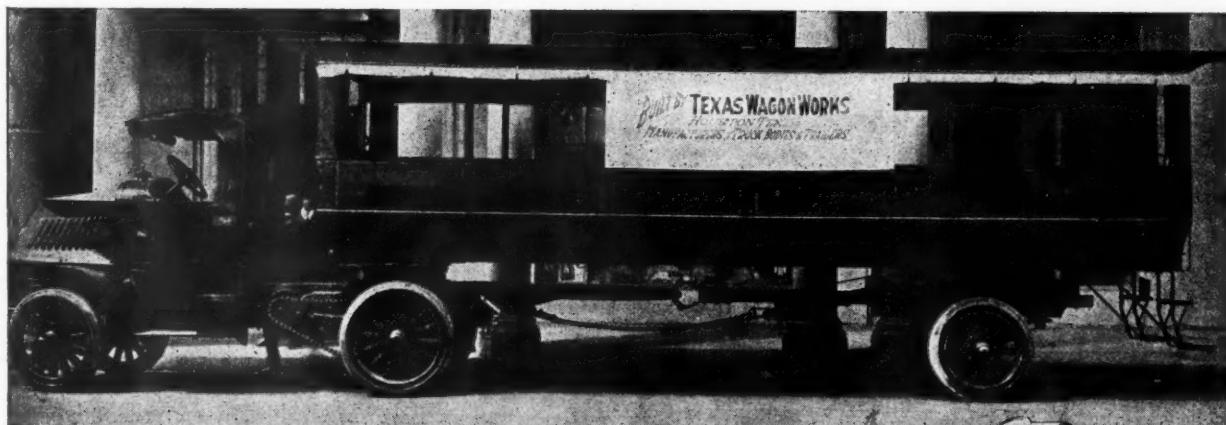
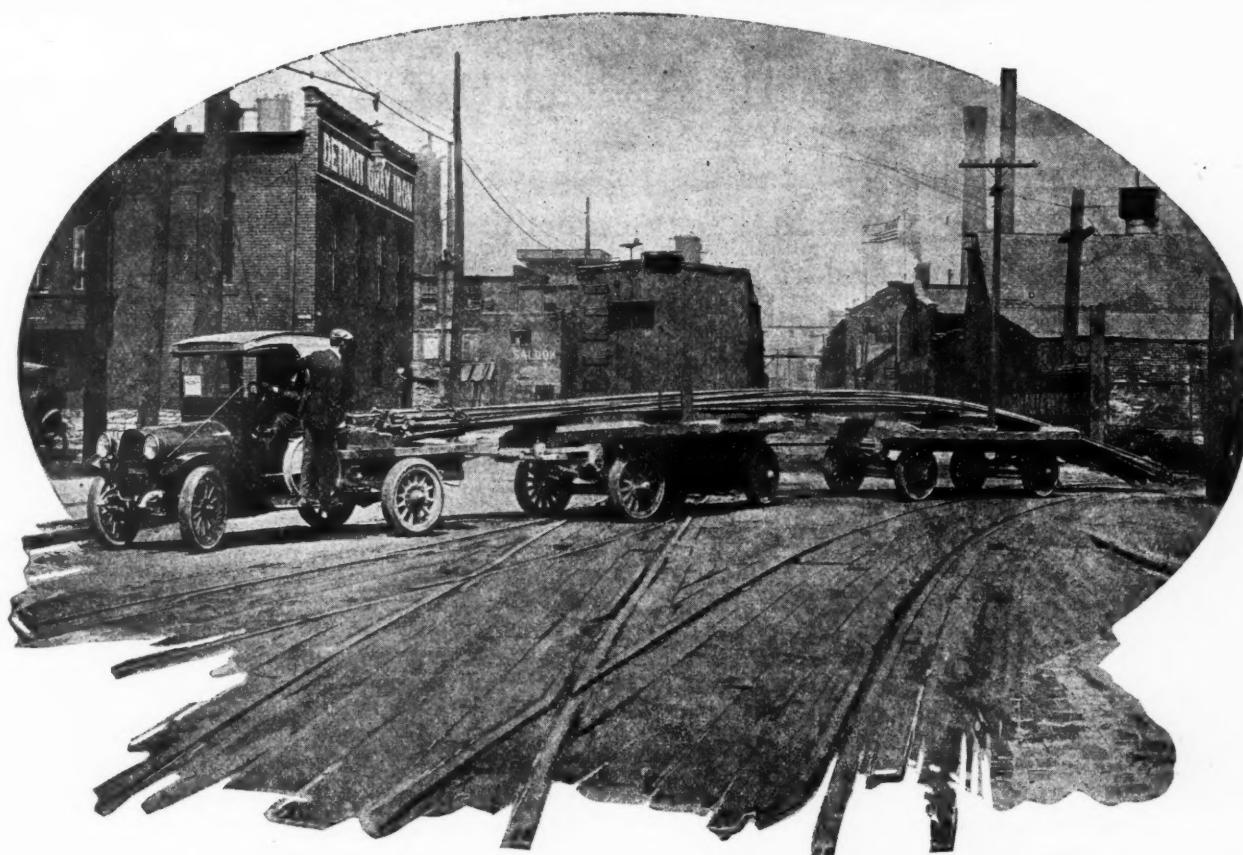
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box. The axle is a steel forging in two parts with the propeller shaft casing bolted to it. As in the case of the gearbox, roller bearings are made use of in the axle construction. Helical bevel gears are used.

Suspension is by means of semi-elliptics in front and cantilever at the rear, the latter being mounted directly under the frame members. Rear wheel brakes are internal expanding within ribbed drums; the foot brake is mounted behind the gearbox and is of the contracting type, with internal ribs on the drum to assist in cooling.

The equipment is very complete. A tire pump is bolted on one side of the gearbox and has the air pipe brought up to one of the side frame members. Electric lighting and starting are an integral part of the chassis. There is a spare wheel carrier back of the gasoline tank. The false dashboard carries clock, barometer, inclinometer, speed indicator, revolution counter, distance type motometer, oil and pressure gage, oil level gage for the reserve tank communicating with the base chamber, gasoline shut off valve, anti-theft lock operating on the steering gear, radiator fan clutch control and the usual electric switches.

Trailers to the Aid of Trucks



Above—Two trailers are used to transport long lengths of iron. Center—A trailer body built to seat 100 persons. At Right—Making a profitable trip load of very light material

An Analysis of the Need for Civil Aviation

In preparing this report to the Executive Committee of the National Advisory Committee for Aeronautics, Dr. Durand has analyzed the general situation very closely and has set forth certain difficulties and conditions that must be met. While all may not agree with all of the conditions he sets forth, his survey of the field and his classification of things as they are and of the reasonable possibilities should supply a good ground for future discussion

By W. F. Durand*

THE broad problem of aerial transport presents itself with reference to two different types of equipment possessing quite distinct and to some extent divergent characteristics and properties. These two types of equipment are, broadly, the lighter than air dirigible balloon and the heavier than air airplane.

Due to the more immediate pressing importance of the problem with regard to the airplane, the present report will deal with this phase of the general problem only, though many of the considerations apply equally as well to both phases of the broad problem. In order to avoid duplication in terms, it will also be understood that often when the word airplane is used, the term is to be understood as applying equally as well to the seaplane. In some cases it will be necessary to use both terms in order to draw comparisons or indicate differences.

The general problem of Civil Aerial Transport by way of the airplane may then be expressed in specific terms as follows:

Given a means of transport with the following characteristics:

- (a) Speed high, broadly say 50 to 150 miles per hour.
- (b) Carrying capacity, small as compared with other means currently employed, and having in view especially, equality of power or equality of investment.
- (c) Reliability and safety, somewhat less at present than in the case of other means currently employed.
- (d) Investment costs, high compared with other means currently employed and having in view a parity of carrying capacity.
- (e) Operating expenses, high compared with other means currently employed and having in view a parity of carrying capacity.
- (f) Route through the air and hence independent of specially prepared roadway or track and hence possibility generally of "bee-line" routes over land and water indifferently. This in conjunction with (a) insures great reduction in

time as compared with other means of transport currently employed.

- (g) At the present time, and presumably as a continuing condition, dependence on weather conditions greater than in the case of other means currently employed.
- (h) Impracticability at the present time of landing at any but specially prepared fields, and hence impossibility of landing at any given point in a city or at a given address, business block, office or private house. Hence in most cases, need of supplementary transport of some character from landing field to ultimate destination.
- (i) Need for special indications to aid in navigation and including particularly, route and location signals by day and by night. Under the same head note may be made of the difficulty of navigating when above the clouds or in a fog or by night, without location signals from known points on the ground; and particularly to the difficulty of allowing, under these conditions, for the drift off course due to the wind.
- (j) Transport under conditions which, humanly speaking, may appeal to the sense of pleasure or enjoyment, or under conditions responsive to the instinct for and love of sport.

With these general characteristics, what use can be made of such a means of transport as a factor in the general commercial and civil life of the country?

As a first step to a reasoned answer to this question, some attempt must be made to so classify the transportation services of the country as to permit of comparing their requirements with the characteristics of airplane transport, as noted above. To this end we may note the principal classes of transportation as follows:

- (1) Transport of people.
- (2) Transport of mail.
- (3) Transport of matter comprising goods relatively light in weight and costly in value or when rapid transportation is a factor of importance.
- (4) Transport of perishable freight when rapid transportation is a factor of importance.

*Member National Advisory Committee for Aeronautics

- (5) Transport of food supplies which may not only be perishable, but when rapid transportation is of importance in order to insure special qualities of freshness and flavor.
- (6) Transport of miscellaneous freight matter.
- (7) Transport of freight matter which is especially heavy in comparison to bulk and for which the value is relatively small per pound or per cubic foot of space occupied—such for example as pig iron, iron ore, coal, etc.

An examination of characteristics (a) to (h) shows that two only (a) and (f) present advantages as compared with other means currently employed, while the remainder present disadvantages. Aside from characteristic (j) the controlling factors which will determine the question of the use of aerial transport in competition with other means are, then, the degree of urgency justifying or demanding the saving of time which may be realized as a result of (a) and (f), or the possibility due to (f) of transport where it might be impracticable by other means.

Under the head of transport of people there is, however, one class of such transport where the controlling factors are quite different from those indicated above. This is the field of pleasure or sport. Here the controlling factors will derive from characteristic (j) and the economic factors are of much less relative importance. In fact in many or in perhaps most cases involving the transport of people, the question of personal pleasure or enjoyment will enter as a factor of significance, varying in degree or determinative character according to the circumstances of the case. This factor cannot, however, be evaluated in quantitative terms, though its presence and significance must always be reckoned in connection with this phase of the general problem.

Sport and Pleasure

In order then, to clear the ground for the examination of applications where economic factors are of controlling importance, we will first consider briefly the leading characteristics of the field of sport and pleasure. Here the chief appeal is to the sense of sport, or pleasure involving an element of sport. This is displayed in games such as baseball, football, polo, etc., or again in so-called sports such as boat sailing, canoeing, skiing, or again in explorations, hunting game, travel in the wild, etc.

In all of these there is the element of contest—contest between man and man or between groups of men, or contest between man and nature. In many of these there is also the element of rapid movement. In all there is some element of hazard.

The airplane responds in high degree to these various constituents of the field of sport. There is the contest with nature, the struggle against adverse weather conditions, the victory over gravity, the conquest of the air, the rivaling of the bird. There is the element of hazard, the appeal to the sense of movement at great speed, the appeal to new experiences in mounting to great heights and viewing the earth spread out below as a great chart. There is the appeal to loneliness and solitude—above the clouds alone with the immensities of space. There is an unlimited element of contest involving the human factor—racing and climbing contests. There is the field of acrobatics reserved for the few who may be able to compass these bewildering and seemingly impossible gyrations and evolutions.

The airplane thus meets, in a unique fashion, the demands which lie at the foundation of the so-called sporting instinct, and it seems reasonable to assume that, within the limits of the economic factors involved, we

may anticipate a continuous and significant growth in the demand for and the use of the airplane for sport purposes.

The type of equipment which will be called for in this field will comprise characteristics of speed, carrying capacity, ceiling, etc., varying according to individual taste, and varying from moderate requirements well averaged up in a machine of balanced design, to extreme requirements in the direction of speed or maneuverability and with corresponding sacrifice in other directions.

Combined Business and Pleasure

Closely allied to the field of pure sport or the use of the airplane as an answer to the demand for a sport outlet, there seems likely to develop a growing use of the airplane for combined purposes of business and pleasure—much as in the field now occupied by the automobile. Thus business men doing business in cities and living in suburbs or outlying towns, or in adjacent sea or lakeside villages, may make use of the airplane as a means of going to and from their place of business. This application of the airplane will open up for business residents the country adjacent to large cities to a radius of 50 to 100 miles or more where now it is correspondingly available by automobile or train to a radius of 30 or 40 miles.

This use of the airplane immediately raises the question of landing places and auxiliary transportation. Here the case differs somewhat for airplanes and seaplanes. In the former, adapted to leave from and return to a hard surfaced field or area, this type of service will suffer somewhat by lack of such fields in the center of large cities and by reason of the impossibility of landing at a given street and number as with the automobile, or at a station reasonably near the business center as with railway service. In most of our large cities as now laid out, landing fields must necessarily be on the outskirts, except as it may be found possible to utilize existing parks for the purpose. Generally speaking therefore, auxiliary transport, automobile, taxi or street car, must be depended upon to complete the trip and to land the commuter at or near his place of business.

In the case of the seaplane, the same general conditions exist. It may often happen, however, that a basin for parking seaplanes may be realized at a convenient point on the water front and with a relatively short auxiliary trip from the landing stage to the office or place of business. So far as hazard may depend on the possible need of making a forced landing, the seaplane has some advantage over the airplane, and for this reason localities where the flight between business and home residence may be made over the water or along a water front would seem to offer peculiar advantages for service of this character, especially where the water is inland and relatively smooth.

The cost of owning and operating such means of transport will, of course, be much greater than in the case of an automobile. Generally speaking, the economic factor will be of the same order as for a good sized motor-boat or small motor yacht. This will naturally limit the number of people who can afford such means of transport, but within these limits it seems safe to expect a growing advance in the use of air transport between business office and outlying residential village.

The special demands in connection with this service will be as follows:

- (1) Convenient landing and parking fields with repair and maintenance service at both ends of the line.
- (2) Possible landing fields along the line if over land and the trip is of some length.

- (3) Suitable route and location marks or signals for the purpose of navigation by night as well as by day.
- (4) Equipment having characteristics measurably responsive to the tastes of the owner, but for the most part with good speed, a high degree of inherent stability and all elements conducing to safety and reliability developed to the highest practicable degree.

This field of service lies between that of pure sport for sport's sake and that of economic service. There is an economic value in rapid transport between home and office. On the other hand the economic gain expressed in minutes of time, as compared with present existing means of transport, especially when all factors including auxiliary transport, etc., are taken into account, will not as a rule be sufficient perhaps to serve as the controlling factor. On the other hand, the expense, as noted above, will be considerably greater than with other existing means, except in the case of the private motor-boat or yacht, where they will be more or less of the same order of quantity. The main factor, then, determining the use of such means of transport will be less, as a rule, not economic in character but will arise rather from the sporting instinct or from the exhilaration and pleasure which may be derived from travel through the air rather than by more prosaic means.

However, when all is said in favor of this means of transport between business office and home and when full weight is given to the factors which will make for a growth in such use of air transport, the fact still remains that the limitations and difficulties at present inherent in air transport may be expected to determine a rate of growth in such means of transport more moderate in character than many of the more optimistic would seem to anticipate.

It is, of course, foolish to ignore difficulties and limitations. They exist whether we will to see them or not. The best policy is to frankly recognize them, giving them their due weight, count on a future development in accordance therewith, and await with confidence such improvements as the future may develop and the removal or diminution of such difficulties as are not fundamentally inherent in this means of transport.

The principal limitations and difficulties which must thus be faced are those arising from characteristics (c), (g), (h), and (i).

There is no evading the fact that at present the safety and reliability of air transport are both less than with other available means. There is a distinct added element of hazard which must and will be taken into account, especially in connection with all matters having a business aspect. In this connection the attitude of life insurance companies toward aviators will have a most important bearing. If a life insurance company refuses to insure against death resulting from air hazard or if the premium rate is made excessive, such fact will have a most important bearing on this extension of air transport. Business men carrying heavy insurance policies will not be willing to risk their cancellation as a result of using air transport between office and home.

Again air transport is now and presumably always will be dependent in greater degree on weather conditions than other means now available. If account be taken of average weather conditions throughout the entire year and remembering that the business man must be able to leave his home regularly in the morning and his office with equal regularity in the afternoon, it will be recognized that in most parts of the country there would be many days when the weather conditions would be unfavorable or impracticable for air transport, and other

means would perchance have to be employed. As much as we may thrill at the thought of having conquered the air by the airplane, we may frankly admit that we have not as yet conquered the storm, or at least not to a degree which would make it wise for the average business man to place dependence on air transport alone for travel between office and home, day in and day out the year through. If for no other reason than this, then, air transport, for the present, can only be considered as a partial means of meeting the requirements of the business man, a means which must be supplemented for some parts of the year and on occasion throughout the year, with other means less sensitive to weather and storm conditions.

The need of special landing fields for airplanes and of special harbor facilities for seaplanes has been already mentioned. Such fields, at least for the immediate future, seem to offer somewhat less convenient terminal facilities than railway transport, while the automobile, in this respect, scores an important advantage over either.

The difficulties of navigation, especially at night or in thick or foggy weather must also be recognized as a distinct limitation to the use of the airplane as a means of transport for the business man between office and home. He will often wish to make the trip after dusk or at night, or again in thick or foggy weather. Under such conditions the difficulties and uncertainties, both of navigation and of landing are too great for the amateur, and some of the more prosaic modes of transport will be indicated.

Recognizing frankly these difficulties and limitations, we must anticipate only a modest rate of growth in air transport for this class of service; such a rate of growth as the economic factors involved will permit and in step with the gradual improvement which we may hope for in connection with the various difficulties and limitations noted above.

Transport of People

We come next to the general problem of the transport of people as an economic matter—not the problem of the man who owns his own machine for pleasure or for combined business and pleasure, but to the problem of the transport of people as a common carrier and in competition with railway, steamboat, stage line, or motorbus transport.

Assume that a given individual proposes to make a journey from one point to another, whether for business or pleasure, inclination or necessity. The chief determining factors in the choice of conveyance will be as follows:

- (1) Expense.
- (2) Time required.
- (3) Safety and reliability as to time of arrival.
- (4) Comfort while en route.
- (5) Transport of baggage.
- (6) Scenery en route or novelty in mode of conveyance or in route traversed.

These will enter, of course, with varying weights, according to special circumstances, but in practically all cases they will all enter in some degree.

Comparing air transport with other means, now available, (railroad, steamboat or automobile) we note that air transport will be more expensive, will require less time, will be less safe and less reliable, will provide less comfort while en route, will reduce permissible baggage to a very small limit, but will offer a novel and attractive experience to the traveler and will insure scenery different in character from that to which he has been hitherto accustomed.

It may also be noted that air transport will naturally present its strongest attraction during daylight hours. Only then will there exist the special appeal of panoramic

earth view. Furthermore under present conditions, air transport in hours of darkness will present decidedly greater difficulties and correspondingly less safety and reliability.

The considerations depending on novelty will, of course, have special significance only so long as air transport is novel and thus presents opportunity for new, interesting and thrilling experiences, and during such period this feature will undoubtedly prove one of the strongest factors in favor of air transport in competition with other methods. Thus for illustration, with an air transport line between say London and Paris, or New York and Washington, or Detroit, Cleveland and Chicago, many people would doubtless pay the extra charge required, accept the greater hazard and any element of relative inconvenience, for the sake of the novelty of the experience. They will be willing to do this once or twice or a few times until the novelty has worn off. The consideration of transport means will then become primarily a matter of economics, safety and reliability, time and comfort. In this schedule air transport has to offer special advantages only in the matter of time, and it will be an open question to what extent the general traveling public will be able or willing to pay the greatly increased charges and accept the other conditions as indicated, for the saving of time. In some cases the saving of time would be all important and would determine in favor of air transport as against all other means and regardless of the other elements involved. It is, however, still an open question regarding the extent to which a sound business can be built up on a situation of this character. On the whole, it seems likely that the use of air transport for passenger service will grow only slowly and in step with the diminution or removal of some of the limitations and disadvantages as noted.

The attitude of life insurance companies on this matter will also have a very pronounced influence. People in general will not be willing, certainly as a routine matter, to hazard their life insurance for the sake of air transport as against other available means. Again for relatively short runs where the time with ordinary transport is only a few hours longer, it is doubtful if air transport could at present compete with such means, at least so long as economic matters only enter into the question.

Much of the loose talk seen in the popular press regarding air transport passenger lines takes small account of the fundamental economic conditions involved. Any project of air transport as a business undertaking, however, will depend for its business success on the interaction of these various factors, economic and otherwise, and it does not seem likely, so long as the conditions of air transport remain as they are, that it would be wise to immediately embark on any large undertaking depending on continuous passenger patronage for business support.

At the most, and for some years, it does not seem likely that passenger air service will more than serve as an auxiliary means of transport, available under favorable conditions and for those who can afford the charges and to whom such means may specially appeal or where some saving of time may be of great importance.

Thus, as a form of air transport not bound to regular routes or regular time schedules, there seems likely to be a growing use of the airplane for special trips across country by public officials or by wealthy persons who can afford such means of travel, and in response to special or urgent calls justifying the expense.

For the development of air transport under conditions as indicated above and in order that it may compete on the best practicable terms with other existing means, the

equipment and facilities indicated may be noted as follows:

(1) Airplanes of large size and with the maximum practicable safety and reliability. This will mean multiple power plants, two, three or four, and with the possibility of safe flight and maneuvering ability with at least any one of the plants inoperative. The planes should at the same time have a high degree of inherent stability, a good factor of strength against any stress liable to develop in service, specially sure and reliable guide and control surfaces and operating gear, and throughout such integrity of design and construction as will reduce to a minimum the element of special hazard, particularly under unfavorable weather conditions.

(2) Landing fields with repair and supply service, located as convenient as practicable to the terminal of the route. Similarly, landing fields for all intermediate stops, with repair and supply service at such intervals as may be found needful.

(3) Assurance of auxiliary transportation, where necessary from landing fields to regular urban systems of transport. In many cases, doubtless, landing fields may be obtained convenient to street car or motor omnibus lines leading to or forming a part of regular systems of urban transport. In other cases it may be necessary to secure or provide special auxiliary transport from landing fields to the nearest convenient point on a regular urban system.

In the cases of seaplanes, similar needs will arise regarding the provision of anchorage and shelter basins and regarding the assurance of adequate connection with regular systems of urban transport. This matter has already been touched upon in connection with air transport for sport and for combined business and sport, and need not be further developed at this point.

(4) Helps to navigation, comprising location and route signals, recognizable both by day and night. This matter has been referred to under the head of air transport for business and sport and need not be further developed, except to point out that for daylight flying and for a pilot flying back and forth over a route day by day, the need of such signals would become less marked. Broadly speaking, however, the general requirement of such means will always exist and must be considered as part of the material equipment to be provided in connection with any plan for air transport.

Giant German Planes

According to an article by Prof. A. Baumann in the Zeitschrift des Vereines Deutscher Ingeneure, Germany built the following sizes of giant airplanes during the war:

H.P.	Useful Load (Lb.)	Ceiling (Ft.)	Year	Engines
750	6,600	9,800	1914-15	3 Maybach
1,250	10,000	1915-16	5 Maybach
960	7,700	9,800	1915	6 Daimler
1,200	10,000	13,000	1915	4 Benz & 2 Daimler
1,250	10,000	13,000	1916	5 Maybach
1,040	7,700	12,500	1916-18	4 Daimler
1,250	10,000	14,500	1917-18	5 Maybach
1,000	10,000	8,000	1917-18	4 Maybach
1,500	11,000	1918	5 Benz

The next to the last model mentioned was a seaplane, while all the rest were land planes.

Planning For a Co-operative Research In Alloys

The solution of many manufacturing problems depends upon such studies. Herewith are given the details and the plan for data that is lacking, concerning alloys and a movement has been gotten under way for the formation of an association to make the proposed work, which should result in a great advancement of knowledge on such subjects

In 1916 there was established, under the Congressional charter of the National Academy of Sciences, the National Research Council, which has for its object the promotion of scientific research in the United States. The Council was organized with the co-operation of various national scientific and technical societies.

The division on Industrial Research, after a survey of the field, has reached the conclusion that great good could be accomplished by the formation of a co-operative association to engage in fundamental research in alloys. It feels that progress in many lines of industry is arrested because of the lack of certain facts which are fundamental and that the solution of a number of manufacturing problems depends upon additional information which can only be obtained by intensive research.

A plan has been worked out whereby both users and manufacturers of alloys can share in the expenses and benefit by the results of the research work which it is contemplated to carry out. The plan is to form a co-operative association and tentative articles of association are printed herewith. Any criticism and discussion of the articles will be welcomed and should be addressed to H. E. Howe, Vice-Chairman, Division of Industrial Research, National Research Council, Washington, D. C.

ARTICLES OF ASSOCIATION for the ALLOYS RESEARCH ASSOCIATION

I NAME

1. The name of the Association shall be Alloys Research Association.

PURPOSE

2. The main purpose of the Association shall be systematic research into fundamental questions affecting pure metals and alloys, both ferrous and non-ferrous. It may also engage in any more specific investigations or experimental work, provided that this work be approved by its Executive Board.

SCOPE OF WORK

3. The Association will encourage the discovery of and investigate and make known to its members the nature and merits of new inventions and improvements in processes and materials. It will co-operate in the development of standard methods of analyses and tests and in establishing standard specifications; it should be prepared to guarantee that the products of its members ful-

fill such specifications and, when called upon, to act as umpire in cases of dispute. The Association may take out patents on processes arising from its work and, where these are considered to be a part of the normal development of the art, members may be licensed to use the rights without fee; where such patents cover fundamental discoveries, rights may be licensed to the members or others in return for such fees as may be levied by the Executive Board.

4. A regular information service shall be maintained which, as far as practicable, shall supply:

(a) Regular summaries of technical information in the metal field.

(b) Copy or translation of any technical article on metals, when requested.

(c) Answers to questions, provided the information is available in the literature.

(d) Maintenance of a complete record of available data on alloys, so arranged that desired information can be immediately located.

(e) Preparation of monographs on each phase of a proposed research.

(f) Analysis and record of results obtained through research.

(g) Service to different laboratories working with the Association, reporting upon all matters bearing upon their investigations.

(h) Editing material for publication or for circulation to the members.

(i) General information covering the metal field.

5. The Association shall encourage and improve the education of persons who are engaged or intend to engage in the use and production of alloys, its laboratories functioning, in some instances, as a sort of post-graduate school.

6. The Association shall co-operate with other organizations in the solution of problems of general interest, such as the more economical utilization of fuel, the provision of better refectories, the health of workers, the abatement of smoke or fume, etc.

ORGANIZATION

7. The Association shall be composed of individual members and of institutes or other associations. Initially, each individual member shall pay \$1,000 annually for a minimum period of five years, while an institute shall be assessed a larger sum, depending upon the extent of its membership and the importance to it of alloys.

8. The members of the Association shall be principally

those who consider alloys raw materials in their manufacturing processes, but it shall also include those who produce alloys primarily for sale in the raw material state.

9. Each member shall have one vote for each \$1,000 subscribed annually.

10. The affairs of the Association shall be administered by a president, vice-president and a director of research, together with an executive board of nine members to be elected by the Association. The president and vice-president shall serve for one year. The director of research shall be chosen by the executive board. Of the nine members of the Executive Board, other than the officers, three shall be elected for one year, three for two years and three for three years, excepting that beginning with the second year three members shall be elected each year to serve for three years. One member of the executive board shall be from the National Research Council.

11. The executive board shall have the power to enter into contracts on behalf of the Association and to employ and discharge employees.

RIGHTS OF MEMBERS

12. Each member shall have the right to submit technical questions to the Association and to have them answered as fully as possible insofar as the literature is concerned, and will have the right to recommend specific subjects for research. If the executive board of the Research Association considers the recommendation of sufficient general interest and importance, the research will be carried out by the Association and the results made available to all its members. If the problem cannot be recommended by the Executive Board for investigation at the expense of the Association, the member proposing the subject for research can still have it undertaken, at cost, for his sole benefit. The cost in this instance shall be the salary of the investigator, the cost of materials used and a reasonable overhead charge to be determined by the Executive Board.

13. Each member shall have the full benefit of the information service and shall have the right to use any patents or secret processes arising from the work of the Association, or purchased by it, upon such terms as may be prescribed by the Executive Board.

14. The specialists employed by the Association, under special circumstances and with the approval of the Executive Board, may be available to the members for work at their plants on particular problems, but where these experts are called upon for such service, the member con-

cerned shall pay all traveling and maintenance expenses and a reasonable fee to the Association.

15. Members shall have the right to place their own men in the laboratories of the Association, up to the capacity of the laboratories, to work under the general supervision of the director and his assistants, these men to be designated as Fellows and to be permitted to work upon special problems for the benefit of the member from whose staff he comes. In such cases the member shall pay a fellowship fee as determined by the Executive Board.

STAFF

16. The staff shall consist of a director of research, an assistant director, who shall be the head of the information service, both appointed by the executive board, and such other assistants, scientists, librarians and technologists as may be required to prosecute the work employed by the Association through the executive board upon the recommendation of the director.

LABORATORIES

17. The work of the Association shall be carried on wherever satisfactory facilities can be found, or eventually in its own laboratories. In general, however, it shall be the policy of the Association to utilize existing laboratories and equipment in so far as satisfactory arrangements can be made. Where the laboratories of educational institutions are concerned, arrangements will be made with the proper authorities to place men, paid by the Association, in the laboratories in question under the general direction of the professor in charge, through whom the Director of Research of the Association will have responsibility for the work.

18. In addition, a central office, where the information service will be located and a laboratory maintained, will serve as headquarters.

PUBLICATIONS

19. The Information Service will issue a series of bulletins to the members of the Association. The results of the work of the Association, particularly those researches of a fundamental character, will be published as soon as practicable after the completion of the work, in the scientific press or in its own bulletin, as appears to be best suited to the purpose. In addition, results achieved in studying specific problems will be published, in the discretion of the Executive Board, within two years after the conclusion of the work.

Panhard to Come to America

PANHARD & LEVASSOR, one of the oldest automobile manufacturing concerns in France, intends to come on the American market within a few weeks. The company maintained a selling organization in New York until about 1907, but since that date has done very little business in the United States.

G. A. Chailliez leaves Paris for New York immediately after the Paris show, with the latest Panhard models and will organize his selling campaign. It is the intention of Chailliez, who for a long time was connected with the Hupmobile organization, to appoint Panhard distributors in all the leading cities of the Eastern states. Two models will be put on the American market. These will be a 16 hp., with four cylinder engine of 85x140 mm. bore and stroke, and a 20 hp., of 105x140 mm. Both are fitted with the Knight engine. The cars will be supplied with high class European bodies.

Factors Determining the Ceiling of a Plane

THE power required to sustain an airplane in the air varies inversely as the square root of the density of the air. For instance, at an altitude of 18,100 ft. the density—calling that at sea level 1.00—is only 0.50. Hence if the power required to sustain the plane at sea level is denoted by 1.00, that required at 18,100 ft. is $1/\sqrt{0.50} = 1.414$. At the same time that the power required to sustain the plane has increased 41.4 per cent, the maximum power of which the engine is capable has decreased substantially 50 per cent. The ceiling of a plane therefore is limited by an increase in the power required for sustentation and a decrease in the engine output with altitude. By means of superchargers it may become possible in the future to eliminate the latter factor.



The FORUM



Gas Consumption at Varying Loads

Editor Automotive Industries:

Have you any data upon the gasoline consumption of an automobile engine at varying loads, from zero to maximum? I want to work out a curve of the relative efficiency at varying loads. Any information you can give me along this line will be appreciated.—HARRY E. DEY, Electrical Engineer, Jersey City, N. J.

The subject of thermal efficiency in its relation to engine output was investigated by Prof. Walter T. Fishleigh of Michigan University and W. E. Lay, and their results are given in an S. A. E. paper entitled, "Heat Balance Tests of Automobile Engines." The engine tested was a six-cylinder $4\frac{1}{4} \times 5\frac{1}{4}$ in. It was tested at three different speeds, namely, 640, 1000 and 1350 r.p.m., and at each speed the load was varied from the maximum down to one-quarter or one-third load. The results are expressed in terms of thermal efficiency. The following table has been compiled from curves published in the paper:

Thermal Efficiencies in Per Cent.

	640 R.P.M.	1,000 R.P.M.	1,350 R.P.M.
5 H.P.	8.6
10 H.P.	13.5	9.4	...
15 H.P.	16.8	12.1	10.0
20 H.P.	19.0	13.7	12.2
25 H.P.	15.1	13.3	...
30 H.P.	15.7	14.1	...
35 H.P.	16.3	14.8	...
40 H.P.	16.8	15.5	...

It will be seen from the above that at constant speed the thermal efficiency increases with the load but at constant load the thermal efficiency decreases as the load increases. At constant torque, the thermal efficiency does not seem to vary much with the speed.

Action of Condenser in Ignition Circuits

Editor Automotive Industries:

I wish you would explain to me briefly, without going into technicalities, the action of the condenser of an ignition outfit. I understand that the condenser holds down the sparking at the interrupter points by absorbing the induced current at the moment of break. But does it increase the efficiency of the coil by helping to increase the voltage in the secondary by its discharge? Has not the high tension current been produced by the sudden stoppage of the primary current before the condenser has time to discharge and set up a reversal of current and polarity? Consequently this discharge has no effect upon the voltage of the secondary.—A. P. FARMER.

The condenser certainly adds to the efficiency of the secondary circuit, for without a condenser in the primary you would get no secondary spark at all, or at best only a very short one. The magnetic field of the coil represents the store of energy which is converted into a spark. In order that a spark may be produced it is necessary first of all that a sufficiently high voltage be induced in the secondary winding of the coil to break down the dielectric resistance of the spark gap. The voltage induced in the secondary depends upon only two things, namely, the number of turns in the secondary winding and the rate at which the magnetic field within the wind-

ing dies out. It is the rate of dying out of the magnetic field which is affected by the condenser in the primary.

The magnetic field is sustained by the primary current. When the interrupter opens the circuit the resistance becomes instantly almost infinite and the current declines in value. As a result the magnetic field begins to die out. But as this occurs there is an inductive action on both the primary and secondary windings. The voltages induced in these windings will be proportional to their respective numbers of turns and to the rate of decline of the magnetic field. The direction of the induced electromotive force in the primary winding will be such as to keep the current going in that winding, and if no condenser were used a heavy spark would be formed at the breaker points, which simply means that the current continues to flow for some time, decreasing gradually. But with a gradual decrease in current we will have a low rate of dying out of the magnetic field and hence a low secondary voltage not able to break down the spark gap and create a spark. On the other hand, if there is a condenser shunted across the interrupter the conditions are entirely different.

The simplest explanation of how the condenser prevents sparking and insures a high secondary electromotive force is to say that it neutralizes the self induction of the primary winding. This self induction is very similar in its effect to mechanical inertia, that is, it tends to prevent the current in a circuit from rising when the electromotive force is increased and from dropping when the electromotive force is decreased. The last case is that occurring in the primary circuit. When the interrupter points open the impressed electromotive force drops to zero but the self induction tends to keep the current going.

Capacity (or a condenser) has the opposite effect, for on increase of the electromotive force there is a flow of current into the condenser in direct proportion to the rate of increase in electromotive force. Therefore, it is possible by means of a condenser to neutralize the self induction of the primary circuit and insure an almost instantaneous cessation of primary current upon the opening of the interrupter points. This insures a high secondary voltage and consequently a sure spark.

Port Duties Charged Export Buyers

Editor Automotive Industries:

Correspondence from Australia has reached the National Foreign Trade Council complaining of what is termed by Australians as "the misuse by American manufacturers and exporters" of the term "F.O.B. New York." This correspondence indicates that a situation has arisen as a result of the practice complained of that might easily prove seriously detrimental to American commerce with Australia.

The council desires to call the matter to your attention in the hope that a uniformity of practice may be developed on the part of American manufacturers and exporters which will obviate the recurrence of such complaint, either from Australia or any other foreign markets.

The Australian complaint is that American manufacturers and exporters who have quoted "F.O.B. New York" have interpreted that quotation to include merely delivery

within the limits of the port of New York, and not necessarily actual delivery of the merchandise on board the overseas vessel. The Australian contention is that the term "F.O.B. port" has only one meaning—namely, "free on board overseas vessel" at the port named—and that a quotation "F.O.B. port" means that the purchaser has no charges to meet except those connected with ocean freight and insurance.

It appears that some American manufacturers and exporters who have quoted prices "F.O.B. New York" or other port, have contented themselves with the delivery of goods within the limits of the port named, instead of on board overseas vessel, with the result that charges for cartage, lighterage, storage and other items have been passed on to the Australian purchaser who had understood that the "F.O.B. port" quotation covered delivery of the goods on the overseas vessel. The possibility of adverse effect upon American foreign trade in this situation is obvious.

There is no question that the original meaning of "F.O.B. port" was "Free on board ship," and that that is the general and usual interpretation of it among foreigners. The National Foreign Trade Council desires to point out that it is essential to the best practice for American exporters and manufacturers in making a "F.O.B. port" quotation to have it mean "F.O.B. overseas vessels," but in any event the quotation, whatever it is, should be unmistakably clear and explicit. If in quoting prices "F.O.B. port," American exporters or manufacturers have in mind any other delivery than on board overseas vessel, they should make perfectly plain exactly what they mean by the use of "F.O.B. port," and that any charges for cartage, storage, or other services, are for buyer's account.—O. K. DAVIS, Secretary, National Foreign Trade Council.

The Use of Fuses on Third Brush Generators

Editor Automotive Industries:

Practically all passenger cars and some trucks are equipped with a generator for the purpose of supplying current for the electrical equipment on the car and for charging the battery. An important function of such a generator is to deliver a charging current which will not vary beyond certain limits with various car speeds. Control is effected by several methods which may briefly be mentioned as follows: Vibrating regulator, bucking series and third brush.

The most common of these methods is the third brush, which derives its popularity from its simplicity, reliability and relatively small cost. The construction differs from that of the ordinary shunt generator in that the field winding is connected between one of the load brushes and an auxiliary brush, called the third brush, which rests on the commutator between the load or main brushes.

When current is drawn from the machine connected to a battery, it results in a distortion of the magnetic field by the reaction of the armature, in such a way that the voltage across the field windings is lowered. This action limits the current supplied to a battery by such a generator. If, however, the generator were run without a battery, there would be no current in the armature to produce magnetic field distortion. In that case the voltage across the field windings would probably treble or quadruple at high speeds.

This would cause an abnormal current flow in the field windings, resulting in high temperature, which would

destroy the insulation of the winding. To prevent such action without a battery, it has been customary to insert a fuse in the field circuit of the generator. This fuse would be of such ampere rating that it would burn out and thus open the field circuit for any value of current which would be destructive to the field windings. Such an abnormally high value of field current is practically never obtained except when the generator is run without a battery.

A few years ago, when magneto ignition was more popular, occasion would arise for the engine to be operated without a battery. But today most cars are equipped with battery ignition, making it necessary to have a battery when operating the engine, in which case the fuse would be a useless addition to the generator.

It is more than likely that in half of the cases where a fuse would burn out, it would be replaced by a heavy wire. In addition, the fuses are a constant source of trouble. Fuse blocks occasionally come loose, due to the vibration of the car and fuse clips usually become oily and dirty, causing poor contact. The fuse is almost always mounted on the outside of the generator frame or on the end brackets, resulting in a projection which detracts from the appearance of the generator. A generator without a fuse presents a machine of slightly less cost. On account of the usual position of the fuse on the frame, a great deal of breakage of the fuses occurs during shipping and assembling on the car.

If it happened that a car having magneto ignition were to run without a battery, the generator could easily be protected by grounding the terminal. Some manufacturers have name plates on the generator warning the owner to ground the generator when operating without a battery.

Since most automobiles have battery ignition, in which case, as has been explained, there is no occasion for the use of a fuse, and since, in cars having magneto ignition, the generator can be protected by grounding upon removal of the battery, it seems that the fuse in the field circuit is of more trouble than of value, and is merely a superfluous addition to the perfected third brush generator.—C. H. KINDEL, Engineer, Industrial Division, Westinghouse Electric & Mfg. Co.

Dependence of Propeller Speed on Altitude

THE indicated horsepower of an engine is directly proportionate to the density of the atmosphere in which it operates, which in turn varies inversely as the altitude. However, the mechanical losses at constant speed are practically independent of the horsepower output, hence the brake horsepower varies even somewhat faster than the density of the air. The resistance encountered by the propeller varies directly as the density of the air and consequently at constant speed the horsepower absorbed varies the same. Consequently with a stationary engine working on a propeller or club it would be expected that the speed of rotation would decrease somewhat if the engine were moved to a higher altitude. This was confirmed by altitude tests made in France in 1916 and 1917. The tests were conducted at Lanharet (6,800 ft. altitude) and Le Galibier (8,100 ft. altitude) and the results were as follows:

R. P. M. UNDER PROPELLER LOAD AT DIFFERENT ALTITUDES	Ground Level 6,800 Ft. Alt. 8,100 Ft. Alt.			
	Engine	Ground Level	6,800 Ft. Alt.	8,100 Ft. Alt.
Panhard, 300 hp.....	1,800	1,740	1,740	
Peugeot, 200 hp.....	2,087	2,081	2,061	
Peugeot, 200 hp.....	1,882	1,874	1,848	
Hispano, 150 hp.....	1,412	1,410	1,390	
Hispano, 150 hp.....	1,960	1,950	1,932	
Renault, 220 hp.....	1,440	1,430	1,410	
Lorraine, 150 hp.....	1,380	1,370	1,355	

Why Some Factories Have Escaped the Unrest Taint

Perhaps you are wondering why Jones' factory has not had a strike. You have not heard of his paying higher wages or doing much of anything to quiet his workers. But there is Smith, who put in a profit sharing plan and had a brass band out to announce it. He had a strike! Queer, isn't it? But read Mr. Tipper's explanation

By Harry Tipper

ONE of the difficulties in connection with the analyses of the labor problem is lack of information as to the reason for a strike or any public discussion of the conditions surrounding the worker, in the cases where the difficulties are the subject of considerable notice in the press.

The only thing which can be secured from the public discussion on the coal strike is the ultimatum of the leaders, and the demands which they make in connection with that ultimatum. These demands are sufficiently political and unreasonable to merit the suspicion that they were arranged by the leaders, or the political spirits within the union organization, and not with the rank and file of the workers. Public sentiment is crystallized against the coal miners, because public convenience and production have been threatened without any apparent reason.

The absence of any discussion upon the conditions of the workers, the real difficulties which the workers have under the manufacturing necessities and the difficulties under which the management are laboring, crystallizes public opinion against labor agitation, whereas public sentiment will be useful in aiding the solution, only when it understands the conditions and is exerted to enforce a reasonable measure of justice toward both sides.

The professional, semi-professional, clerical and other forms of labor, plus the farmer, comprise the balance of power in this country, and this section of the population is getting pretty tired of the truculent character of labor demands as voiced by labor leaders. High prices, shortage of products and inconvenience contribute in some measure to labor unrest and consolidate this opinion against the strike movements which are taking place.

Permanent improvement in industrial relations between capital, management, labor and the public, can be secured only by a fuller understanding of the circumstances and a gradual development in the appreciation of the mutual obligation. This fuller understanding is not advanced any by mere change of public sentiment because of the attitude of the labor leader and the absurdity of his platform, and it is to be regretted that so little attempt is made to take up the actual conditions on both sides in the important difficulties and to analyze the weakness of the present situation.

It is even more important, now that public sentiment is beginning to consolidate itself against the misuse of

power by the labor leader, for the manufacturer to understand the thought, influence and desires of his own workers in his own factory, for a considerable percentage of these men are not interested in the political desires of a leader or in his personal ambitions. They are following him only because they are willing to get as much as they can while the getting is favorable.

There is rebellion in the union ranks against the solid, conservative leaders of labor and the reflex action of that rebellion shows in the departure of the leaders from their old conservative stand, in their haste to retain a percentage of their power. This revolution is fostered by those radicals who are sympathetic with the I. W. W. or direct actionists; supported by those politicians in labor circles who are anxious only about their own power. The direct actionists do not want an industrial agreement, they refuse to make contracts and if there is no unrest they constantly foment it.

Industrial peace, or even a reasonable armistice, would leave them without any program. It is only by keeping the population discontented, by interrupting production, by maintaining shortage of product, that these people can succeed in getting any large following for the program of the revolutionary syndicalist, "the proletariat ownership of industry."

The boring from within which we have heard so much about in connection with the American Federation of Labor is not a new process, but has been going on for years.

Wherever it is possible, the I. W. W. and bodies similarly situated secure control of the local union machinery and proceed to foment unrest, secure union approval to a set of unreasonable demands and present them with ultimatums for the very purpose of creating strikes and preventing the settlement of strikes. This revolution, therefore, within the ranks of labor, while it indicates the slackening of discipline and makes it impossible for agreement to be counted upon, is only the physical symptom of the disease and will not in itself strengthen the position of the manufacturer or permit him to neglect the study of labor conditions.

It does give him an opportunity to get on common ground with his own employees, arrange to bargain collectively with his own workers inside of his own plant, and permit them to choose their own representatives within the plant, in such a way as will form an orderly organization for the discussion of

working conditions and the agreement upon all rules and regulations.

It makes this opportunity more important to the individual manufacturer, because the results of orderly organization, for collective bargaining and representation within the industrial plant, will apply to the individual employee's necessities and grievances much more effectively than the slow process through labor union machinery or the inefficiency of the direct actionist strike.

It must not be forgotten that in all this confusion; when very few lines of business have escaped without difficulties with their workers, and when the number of strikes is so large that it is almost impossible to secure a complete tabulation of them; it is always possible to find one or two plants in every line of industry where they have worked right through the period of unrest without a strike or any apparent difficulty and with contented workers.

There are examples in most industries of individual practice which have been so successful in eliminating difficulties, that the workers within the organization of these individual plants have gone right along as though there were no unrest in industry and no new economic theories to be exploited.

Furthermore, these plants are not always manned by American labor or by intelligent and skilled workers. Some of them employ foreigners of all kinds and illiterates. Even with these difficulties they have been successful. In every case their success has been based upon three things:

1. Proving to the workers that they were just and merited confidence and trust.

2. Providing opportunities for discussions and machinery for the recognition of the individual.
3. Providing an incentive of individual responsibility and reward.

We have stated in Automotive Industries from time to time the principal systems employed to secure these three things in an industrial plant and to develop the kind of spirit which will continue to operate universally for production purposes, even under abnormal conditions of unrest and dissatisfaction.

But these systems will be of little importance unless the men who are entrusted with their operation have studied the workers' point of view and have some sympathy and broadmindedness with human mistakes and human organization necessities.

It is a pity that the rapid development of this physical unrest has induced many manufacturers to establish industrial relations departments somewhat hastily without making sure as to the qualities possessed by the personnel of that department. The quality of the industrial relations manager and his assistants is so important a matter in this connection, that we shall enlarge upon it in a future article.

Not to make any attempt to satisfy the human necessities in industry is bad enough, but to attempt to establish proper relations with the workers in an industrial plant, without a careful knowledge of the calibre and capacity of those who will do such work is worse than making no attempt at all. It can only result in deepening the suspicion which already exists and further delaying the establishment of the confidence which must precede the orderly development of universal industrial relations.

American Tables of Physical and Chemical Constants

A FACT which is not generally known is that during the war the colleges, universities and the industries were combed for copies of Landolt and Bornstein's Tabellen, a German collection of chemical and physical constants, and that hundreds of these works were in daily use in the Army, Navy, Airplane and Medical Departments, to say nothing of those used by the Council of National Defense, National Research Council, shipbuilding and explosive departments and many others too numerous to mention here.

Because these tables are printed in German and therefore are not available to many who are in need of this sort of material, and because they are not up to date and are poorly indexed, it is now proposed to issue an American critical compendium of Chemical and Physical Constants, which shall be up to date and correct. The new Compendium is to contain such new constants as can be determined before the time of publication as well as many which have been determined but which are not now generally available.

At a meeting of the Inter-allied Chemical Conference held in London, July 14-17, 1919, there was formed an International Union of Pure and Applied Chemistry, and it was voted that, "Critical Tables of Physical and Chemical Constants shall be published in the United States and there shall be created an American publication committee charged with the general organization and the prosecution of the work."

At the meeting of the International Research Council

held in Brussels on July 22, 1919, the International Union of Pure and Applied Chemistry became the Chemical Section of the International Research Council. The vote in regard to the publication of critical tables of physical and chemical constants was confirmed by the Chemical Section and by the Physical Section.

This work has been undertaken by the National Research Council in co-operation with the American Chemical Society and the American Physical Society. The business arrangements are to be in the hands of a board of three trustees: Hugh K. Moore, Chairman (appointed by the National Research Council); Julius Stieglitz (appointed by the American Chemical Society); Edward P. Hyde (appointed by the American Physical Society). By vote of the National Research Council, these gentlemen have been authorized to raise by subscription a sum of \$100,000 and as much more as may be found necessary in order to meet the probable deficit which will result from carrying out the task assigned to the United States by the International Research Council.

SECRETARY REDFIELD, in an address before the International Conference at Atlantic City, advocated the formation of a foreign finance corporation with an original capital of \$500,000,000 to \$1,000,000,000, preferably the latter, which will finance exports to Europe and the world, accepting long term securities and obtaining additional funds by sale of bonds to investors in the United States.

AUTOMOTIVE INDUSTRIES

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Morals in Exporting

At a recent meeting of exporters in New York there was much said about "Moral side of after the war exporting." The idea was this—there are certain countries that should be encouraged to produce rather than to buy for the next few years. So, if an American exporter is asked to ship some finished article to a country that can produce this article, he should decline the business.

This is perhaps rather an idealistic idea and one speaker—a banker—referred to this phase of it. And then he said: "But it will not require much idealistic courage on your part to meet the conditions, as there is sufficient demand for any finished article in countries that cannot produce it to keep all factories busy. I could say, as practical advice, that any manufacturer can get all of the trade that he can handle without taking any from the countries that should produce."

There is much of good in this suggestion. The more that a country can be encouraged to hasten to produc-

tion, the more quickly will its restless population settle down to routine and more contented life. The more quickly the populations of all countries get busy, the more quickly will the world settle down and restore desirable conditions. And so, when you are considering your field for the sale of automotive vehicles, select those countries that would not under normal conditions produce such an article as you have to offer, and seek to establish your trade there.

High Gasoline Mileage

RECENTLY a good many lay people in motor circles seem to have been stirred up considerably over a news item from Rochester, N. Y., printed in newspapers in various parts of the country, to the effect that a local inventor had contrived an electrically heated vaporizer which was expected to revolutionize the automobile industry and which permitted a four cylinder car to be driven a distance of 90 miles on one gallon of gasoline. When it is considered that the average mileage on a gallon of fuel is only from 10 to 20, it will be seen that the claim is most extraordinary, and it is no wonder that it made an impression on the motor using public.

Unfortunately, when we come to investigate the matter, it is difficult to see where the enormous increase in economy is to come from. In the first place, electric vaporizers are not new. A number of them have been on the market for several years, and while they possess merits as an aid to starting in cold weather, it is the general opinion among engineers that to use electric heat for vaporizing the fuel in normal operation would be the height of folly. In burning gasoline in an internal combustion engine we throw away about 50 per cent of the total heat content in the exhaust. The heat necessary for vaporizing the fuel is only a small fraction of the exhaust heat, and as the latter is available for vaporizing purposes, except at the moment of starting the engine from cold, it would be sheer waste to burn additional fuel to generate electricity for vaporizing the fuel.

Exhaust heat will accomplish the purpose as well as heat electrically produced. To vaporize a certain quantity of gasoline of a given composition requires a definite amount of heat and how that heat is generated makes no difference whatever. Therefore, it is certainly the most reasonable thing to use the waste heat of the exhaust for the purpose.

Vaporization by exhaust heat is now the common practice. There is a plentiful supply of this heat, and the fuel system is generally so designed that all the heat necessary is imparted to the mixture before it enters the cylinders. Nevertheless, the fuel mileage is seldom greater than 20. The best fuel efficiency with a water-cooled car ever brought to our notice was about 52 gross ton-miles per gallon, and even this figure was not universally accepted at the time. Therefore, if the inventor of the device referred to actually obtained 90 miles with a water-cooled four cylinder car of average weight from a measured gallon of gasoline, the only explanation that we can offer is that his gallon measure must be considerably over-size.

BLAME D. H. PLANES FOR RACE DEATHS

**Construction Caused Fatalities
Says General Menoher—Sees
Future for Commercial Plan**

WASHINGTON, Oct. 28—The accidents occurring in the transcontinental race flights are blamed by the War Department on the fact that pilots in the DeHaviland-4 planes are seated between the engines and the gas tanks, and, in event of crashes, are offered no opportunity to escape.

Officials of the Army Air Service were enthusiastic over Lieutenant Maynard's air flight across the continent, and said it was practically invaluable to the service. "This remarkable flight," said General Charles T. Menoher, director of air service, "certainly blazed the trail for extensive commercial aviation in the future and proves that the contemplated aerial route from the United States to Alaska is not merely a dream, but is practical and easily can be accomplished. In flying from New York to San Francisco—2,700 miles—in a little over a day and a night, Maynard covered almost one-ninth of the earth's circumference. In the entire flight of 5,400 miles, or that of the entire course, he covered almost one-fourth of the earth's circumference. It does not seem that the time is far off when the entire circumference of the earth will have been circumnavigated by airplanes."

Referring generally to the fatalities and accidents attending the test, General Menoher says that 74 airplanes were entered. Five were involved in accidents that resulted fatally to one or more of the occupants, and two entered in the contest were wrecked and fatalities occurred prior to the start of the test.

"Four of the accidents," says General Menoher, "were due to stalling close to the ground and the inevitable slip of the wings, which could not be righted before the plane crashed to the ground. Bad flying weather and errors in judgment are also supplementary reasons for the accidents.

"A number of minor accidents occurred in which there were no fatalities or serious injuries to passengers. Several airplanes were forced to land on account of snow, rain and fog. In several instances those landings on strange fields resulted in damage to the airplane and minor injuries to the occupants. Some airplanes were wrecked on regular airdromes when the wheels or axles gave way, but in general no injuries to aviators resulted.

"All of the fatal accidents occurred in DH-4 airplanes, and generally the pilot or passenger riding in the front seat, between the engine and gas tank, was the victim. It is generally known that a DH-4 airplane, when crashing from a considerable altitude, offers very little hope for the pilot seated between the engine and gas tank. However, in ordinary accidents, such as sometimes occur when a forced landing is made on rough

ground or bad landing is made on an air-drome and the airplane noses up, the framework of the DH-4 holds together and the pilot and his passenger are not seriously injured. The new type of DH-4, with both pilot and passenger seated behind the engine and gas tank, is much safer than the old one."

**Publication of this issue of
Automotive Industries has been
delayed until Nov. 26 by conditions
over which the publishers
have had no control. Further
issues will be forthcoming as
rapidly as they can be printed.**

Industrial Awards at N. A. C. C. Annual Banquet

NEW YORK, Oct. 28—The grand ball room of the Commodore Hotel in New York has been engaged for the annual banquet of the National Automobile Chamber of Commerce to be held on Tuesday evening, January 6, 1920, which is during the New York Automobile Show.

Besides the one speaker, which it is customary to have at N. A. C. C. affairs, there will be a presentation of awards to individuals who have rendered important service to the industry during the past twelve months and an original play on timely topics in the industry written and staged by Fred E. Dayton, vice president of the Ajax Rubber Co., and Henry Caldwell, automobile editor of the New York Herald.

With the additional accommodations that the ball room provides, it will be possible to care for a number of men in the industry aside from the motor car and motor truck makers who are members of the N. A. C. C. Balcony seats will be provided for women who wish to attend.

Government Announces Used Equipment Sales

WASHINGTON, Oct. 28—The Director of Sales of the War Department has announced the sale of used passenger cars, trucks, ambulances, motorcycles and side cars at various camps throughout the country during October and November. The Motor Transport Corps has sold approximately 1,800 vehicles which were unserviceable for further government use.

PARTS COMPANY ORGANIZED

MILWAUKEE, WIS., Oct. 28—The Badger Screw Products Co. has been organized by Walter A. John, J. Jaeckle and Harry H. Ninnear to manufacture and deal in automatic screw machine products and metal parts, and specialties for the automotive industries. The capital stock is \$25,000.

SEPTEMBER IMPORTS SHOW BIG INCREASE

**July High Record Exceeded by
\$92,000,000—Imports Show
Decided Drop**

WASHINGTON, Oct. 25—A decided increase in imports and an important decrease in exports are the outstanding features of this country's foreign trade for September as issued today by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

Imports for September amounted to \$435,000,000, which is \$92,000,000 more than the previous high record established in July of this year. The total for September of last year was \$262,000,000. During the nine months ended with September of this year, imports amounted to \$2,697,000,000, against \$2,323,000,000 for a similar period of 1918.

Exports during September were valued at \$593,000,000 as compared with \$646,000,000 in August of this year and \$550,000,000 in September, 1918. In the nine months period of this year, exports amounted to \$5,866,000,000 against \$4,559,000,000 for the corresponding nine months of 1918.

The excess of exports over imports during September amounted to \$158,000,000, the lowest figures for any month since July, 1917. During the nine months period ended with September of this year, the excess amounted to \$3,169,000,000 against \$2,237,000,000 for a similar period last year.

Air Service Reports 9,586 Planes on Hand

WASHINGTON, Oct. 28—The Air Service reports 9,586 planes and 32,033 engines of all types on hand, fifty-four per cent of the planes and 57 per cent of the engines are of the active class.

Airplanes and engines are classified as "active," "obsolete" and "obsolete." Obsolete types will be used until the supply is exhausted, but no extensive repairs are to be made or additional spare parts manufactured. Obsolete types, no longer used, will be held until final disposal has been authorized.

Danielson Engine Works Now Danielson Tool Co.

WAUSAU, WIS., Oct. 25.—The Danielson Engine Works of Chicago, established in 1915, has been re-incorporated in Wisconsin with \$100,000 capital as the Danielson Tool Co. of Wausau, Wis. A new plant has been opened in Wausau which will be devoted to the manufacture of a line of 200 different tools, jigs, fixtures, stands, etc., designed especially to facilitate repairs on the Ford.

The officers of the new corporation are: President, T. H. Jacob, Ford dealer, Wausau; vice president and general manager, Frank Danielson; secretary, John M. Lull; treasurer, George Stolze.

POST OFFICE DEPARTMENT TO UTILIZE RESULTS OF TRANSCONTINENTAL RACE

Otto Praeger, Second Assistant Postmaster General, Announces Plan to Extend Airmail Service to San Francisco Next Spring

NEW YORK, Oct. 25—Otto Praeger, Second Assistant Postmaster General, announced through the American Flying Club last night the intention of the Post Office department, as a result of the transcontinental race, to extend the aerial mail from New York to San Francisco by next spring.

"We can and will extend the aerial post clear to San Francisco by next spring," Mr. Praeger said, "if Congress passes the bill introduced by Representative Julius Kahn. The Kahn bill was introduced before the transcontinental race was begun by the army. As this race has progressed, the Post Office Department has received many urgent appeals from cities along the line of flight, asking that the aerial mail be established as soon as possible. Thanks to the activity and initiative of the army, we have obtained the necessary information as to meteorological condition, landing fields, and, more than all, as to the intense interest of the people. Mr. Kahn's bill directs the Postmaster General to establish transcontinental mail transportation forthwith.

"This is impossible at present, for we have barely enough money in the aerial mail division to operate the aerial post from New York to Chicago and Washington to New York, until July 1, 1920. The pioneer work which has been done by the Army transcontinental flyers, however, should enable us to get this service into operation with less cost, the reason being that much of the observation work already has been done, and satisfactory landing fields have been established at the various divisional points. These we will lay down in our New York to San Francisco mail route.

The Cross-Continent Route

"In this race, the Army placed its controls 200 miles apart or less. Even with such inadequate equipment as the Post Office department possesses, we expect to carry the mail from New York to San Francisco in hops of about 450 miles each. When we get new equipment, we will be in a position to make non-stop runs of 700 or 800 miles.

"The New York-San Francisco route should touch at the following cities: New York, Cleveland, Chicago, Omaha, Salt Lake City, Carson City, Nevada and San Francisco. Emergency landing fields will be established at Bellefont, Pa., Bryan, Ohio, Des Moines, Cheyenne and Battle Mountain.

"During the trans-continental race, the air mail landing fields everywhere were available to the army fliers. In carrying the mail across the Continent, we will be

glad to utilize the new landing fields which have been established by municipalities at the instance of the Army. This is particularly true of the field at Battle Mountain, which Lieutenant Maynard said was constructed within a few days. The present landing field at Omaha is inadequate, and will have to be enlarged. The only field which we now lack in order to put the transcontinental mail in operation, is at Carson City, but it is possible that the field at Reno could be utilized until our arrangements are completed.

Air Mail Record

"I wish to call the attention of the country to the record made by the air mail service. The New York-Washington route was established May 15, 1918. It measures 218 miles by air. It takes from 2½ to 3 hours to carry the mail by airplane. The distance between Washington and New York is 226.80 miles by rail and for the fastest train to travel between these cities requires from 4 hrs. 57 min. to 6 hrs. 20 min.

"The New York and Cleveland route, which measures 410 miles by air, and 620.64 by rail, was established July 1, 1919. The fastest time which a rail train makes between New York and Cleveland ranges from 13 hrs. 5 min. to 17 hrs. 20 min. Day in and day out, the air mail is carried from 4½ to 5 hrs.

"The air route between Cleveland and Chicago was established May 15, 1919. The air route measures 325 miles, and requires from 3½ to 4 hrs. for the trip. The distance by rail between Cleveland and Chicago measures 340.28 miles and requires from 6 hrs. 55 min. to 10 hrs. 30 min. by train.

"Eight mail airplanes are in the air each day. Each day they fly 1906 miles, carrying 2,100 lbs. of first class mail, 84,000 letters, or more than 30,000,000 letters each year. All mail is advanced in delivery, as a result of the air mail service, from 16 to 24 hrs."

To show how even the limited serial mail facilities advance delivery throughout the United States, Mr. Praeger pointed out that first class mail from Washington and Southern states is delivered in New York 16 hrs. earlier when carried by airplane, than when carried by train. The same is true concerning letters from New York and New England for Washington and points in the South. Operation of the mail between New York and Chicago is timed so as to connect with the fast Pacific Coast trains, thus delivery is advanced 24 hrs. to the Pacific Coast and 16 hrs. to Chicago.

S. A. E. to Issue New Alloy Specifications

NEW YORK, Oct. 25—Revision of the specifications for aluminum and bronze is planned by the non-ferrous metals division of the Society of Automotive Engineers. Since the previous specifications were issued, there have been new alloys developed and old alloys changed and it is the intention of this division to outline new specifications that will make them more nearly parallel with the iron and steel specifications. Two subdivisions of the committee are preparing to circularize the trade to learn the present practice before determining the new specifications.

Goodyear Tire Output Reaches 30,000 Daily

NEW YORK, Oct. 28—Although the Goodyear Tire & Rubber Co. is making 30,000 tires a day, according to a recent statement by President F. A. Seiberling, the company is able to produce only 70 per cent of its sales requirements. Sales for the fiscal year ending Nov. 30 are expected to reach \$165,000,000, with net earnings of more than \$20,000,000.

On Nov. 17 the stockholders were asked to approve an issue of \$40,000,000 of the \$100,000,000 new cumulative 7 per cent preferred stock, the proceeds of which will be used to retire two existing issues of second and preferred stock.

Lyons Fair to Feature Automotive Products

NEW YORK, Oct. 28—Products of the automotive industries are to be featured among the special exhibits at the spring term of the Lyons Fair, which will be held in Lyons, France, March 1-15, 1920. Announcement of the date of the fair, which is of international scope, was made recently by Ernest Perrin, official representative for the United States, with offices at 3 Park Row, New York.

An advance catalog will be issued and circulated in foreign countries one month previous to the opening of the fair. In order that participants may have the advantage of this advertising, their entry forms must be filed with Ernest Perrin before Nov. 24. Exhibitors who do not wish to be included in the catalog have until Dec. 31 to file. Exhibits must be delivered to the American Express Co., official carrier, by Jan. 15.

TWO BRITISH SHOWS IN 1920

LONDON, Oct. 1 (Special Correspondence)—It is understood in trade circles that the Society of Motor Manufacturers and Traders has been advised by the management committee to hold two successive car shows next year, with the provision that the members who ballot for the first show will automatically be placed in the second show the following year.

Service Tractor Schools

ONE thing can be said without fear of contradiction. Wherever the manufacturer has thoroughly tried the school system of giving instruction to tractor owners, he has become an enthusiast in this work and the only question now remaining is how he can improve and expand the system of schools.

Recently Automotive Industries addressed letters to the more prominent tractor manufacturers and distributors, asking them their plans for service schools during this winter. The replies are intensely interesting. Aside from the above deduction, another can be drawn with equal certainty.

Wherever the manufacturer has no definite plan for the conduct of such schools, his answer to the query from this paper is apologetic in tone and he appears to be groping for some good explanation of why this has not been done.

The most successful schools are those which have been the longest established. One manufacturer who has been conducting schools since 1912 has extended them to a point where they cover practically the Central United States. He will go even further in extending this work and each year is throwing the entrance to these schools more open, until he has reached the point where anyone is admitted who owns or operates a tractor or who sells tractors. Practically the only bar to admittance to this school is put against classes of tractor schools, or entire corps of mechanics from a dealer, either automobile or tractor.

The present plan in conducting these schools appears to be to send competent instructors, equipped with prepared text-books, containing questions and perhaps short descriptions of the different parts of a tractor, and with moving picture machines and views, so that the show may be put on at any time and under almost any circumstances where electricity for light can be obtained. A blackboard is used for demonstrating the various mechanical designs and especially for listing the troubles. Every tractor owner or dealer present is asked to present all of the troubles that come before him in actual practice, so that these practical things can be taken up.

One of the highly illuminating comments in these letters is from a manufacturer—and remember that it comes from a tractor manufacturer who had probably more tractors in the field than any other one concern—who writes:

"We find that this educational work among the dealers better fitted them to serve the farm owners and render prompt and efficient service. In addition, it reduced our incoming service correspondence by more than 75 per cent."

It is interesting to note from the letters that the companies which have not confined their tractor schools to their own tractor owners, are the best satisfied with the results. Also, those who have entirely divorced the selling campaign from the service educational campaign are the more pleased with results.

It is very clear from the letters that the tractor service school is not primarily a dealer or distributor duty. The most satisfactory results have been those which originated from plans of the manufacturer and are carried out by him. In many cases, the manufacturer has held the schools in the establishment of the distributor or the branch office and, in so doing, has trained the traveling men, the dealer and distributors so that they may go on the road and hold service schools elsewhere.

Most of the agricultural colleges are now giving special tractor courses and it is not infrequent for the instructor of one of the service schools to be asked to come to a college or school and give his talk there. Also, instructors who have proven themselves to be worth while in instructing tractor owners, often are requested to appear before the various automobile and tractor schools. In this way, they continue to spread the propaganda of good and intelligent tractor care and it is to be supposed that a man who has been thoroughly instructed in the use of one tractor, has been sold on that proposition to the extent that if there is any question later about which tractor he will buy, he will buy the one that he thinks he will understand.

WHEEL COMPANIES IN \$20,000,000 MERGER

**Hayes Co., at Jackson, Mich.,
Nucleus of Combine—Production 5,000 Daily**

DETROIT, Oct. 28—The Hayes Wheel Co., of Jackson, Mich., is considering a proposal for a merger of that company with the Prudden Wheel Co., the Auto Wheel Co., and the Gier Pressed Steel Co., of Lansing, the Hayes Motor Truck Wheel Co., of St. John, the Imperial Wheel Co., of Flint, and the Pioneer Pole and Shaft Co. and the Weiss and Loesch Co., of Piqua, Ohio. The proposed consolidation contemplates a capitalization of \$20,000,000 with headquarters at Jackson.

The Hayes Wheel Co. is the largest of the interests involved, having a daily output of 5,000 sets of wheels and a business of \$20,000,000 a year, and is the only one of the companies manufacturing steel and wire wheels. The Pioneer Pole and Shaft Co. manufactures rims and spokes, the Ohio companies in the proposed merger being the largest spoke manufacturers in the country.

C. B. Hayes, of the Hayes Wheel Co., said his company was considering the proposal, but refused to make any statement regarding the details as to the financing program, the probable officials or the date when the merger would become effective. The Gier Pressed Steel Co., and the Prudden Wheel Co. have been closely associated and it is said officials of the head of these companies conceived the plan for consolidation. The Continental and Commercial Securities Co., of Chicago, will, it is said, underwrite the stock issue. It was learned unofficially at Jackson that the proposed merger plans had been ratified by all of the companies except the Hayes Wheel and favorable action by that company was said to be assured.

Overland Refund Plan Traces Car Thieves

DETROIT, Oct. 25—The Willys-Overland Company plan of charging the dealer \$5 above the regular price and refunding when the dealer reported the sale of the car with the name and occupation of the purchaser, not only has proved of value to the firm but has aided materially in the recovery of stolen cars. Instances of the value of the plan in locating stolen cars have been brought to the attention of the factory frequently since the system was evolved a few years ago and other manufacturers are taking it up as an added safeguard to the automobile owner.

Under the system a certificate is attached to each car sent out from the factory, calling for a refund of \$5, which the distributor is compelled to pay the factory. The distributor collects his money from the dealer and the dealer in turn, in order to get his \$5, returns the certificate to the factory, with the name,

address and occupation of the purchaser thereon and the factory refunds his money.

The certificate bears on its face the serial number of the car, the engine number, of course, being on record at the factory. Shifting an engine thus is of little benefit to the thief, for a wire to the factory, in case of suspicion that a car may have been stolen, brings the name of the purchaser, the number of the car and the number of the engine that should be in that particular car. Inquiry of the purchaser enables officers to trace the transfer and movement of the car and determine beyond question whether it has been stolen. The plan was originated to keep an exact check on the sales each month and the personnel of the purchasers but its value as an aid in theft detection has overshadowed its importance as a sales checking system.

Curtiss Airplane Corp. Back on Peace Basis

NEW YORK, Oct. 28—The Curtiss Aeroplane & Motor Corp. has made rapid strides toward converting its organization from a war to a peace basis. The recently issued balance sheet discloses that since Dec. 31, 1918, the company has paid off government mortgages and interest amounting to \$4,788,235, and advances in payment on contract of \$3,783,099.

Bills payable showed a striking decrease of \$4,653,642 from \$4,907,873 to \$254,229, on June 30, 1919. These items alone, which eliminate debts aggregating \$13,224,976, resulted largely from the government payment in liquidation of war contracts.

Among the liabilities is an item "Initial payment by U. S. Government on account amortization, \$4,000,000." This is part payment of the Curtiss company's claim of more than \$6,000,000 against the government for building the Buffalo plant.

In the assets of the company accounts and notes receivable is shown a decrease from \$4,762,661 to \$2,740,743 and in the inventories a sharp reduction of \$5,874,060 to \$610,540. Property account was listed at \$6,589,380, a decline of \$305,583 in six months.

Total assets and liabilities of the Curtiss corporation on June 30, 1919, were \$16,072,229, as compared with \$24,343,054 on Dec. 31, 1918. The surplus was \$2,271,020, against \$681,095. Current assets at the end of June were \$6,209,674 and current liabilities, \$2,410,909, leaving a working capital of \$3,798,765.

OHIO STATE CONVENTION

CLEVELAND, Oct. 27—More than 1,400 delegates are expected to attend the State Automobile Convention, which will be held here Dec. 3-6, under the auspices of the Cleveland Chamber of Commerce and The Automotive Association.

NASHVILLE SHOW FEB. 9 TO 14

NASHVILLE, TENN., Oct. 27—The 1920 automobile show of the Nashville Automobile Trade Association will be held in this city Feb. 9 to 14.

WILLYS COMPANY GETS MORE LAND

Further Plans for Expansion of Light Six Factory at Elizabeth Announced

NEW YORK, Oct. 28—John N. Willys, president of the Willys Corp., today made public further plans for the expansion of the plant at Elizabeth, N. J., where the corporation's new six-cylinder car is being manufactured.

"With the acquisition of the tract of land immediately adjoining our other property, formerly that of the Duesenberg Motor Corp., all the ground required for our additional factory buildings has been obtained," Mr. Willys said. "The work of construction will be launched immediately.

"The outlined plans provide for new buildings and equipment, which will make this plant one of the largest in the industry. These plans will necessitate an expenditure of many millions. One of the several additions, plans for which have already been drawn, will be 1800 ft. long and four stories high. This will be utilized for final assembly. There will be a second large building several hundred feet in length and three stories high and nineteen smaller buildings of two floors.

"All the buildings will be constructed of concrete and brick and will be of modern industrial architecture. They will be absolutely fire-proof and will be in keeping with the general appearance of the present buildings.

"On the newly acquired plot of ground, an assembly hall and recreation center for our employees will be erected. The hall will contain a miniature theatre and a recreation floor and will provide forms of recreation to make it an ideal club house. Here also will be installed a cafeteria in which meals will be served the factory workers.

"The buildings will be so placed as to provide for the latest methods in progressive assembly. The material will be moved from building to building as the manufacturing process requires, by means of chains and rollers. Beginning in the department where it is received, consecutive operations will carry the material through to the loading platforms, a finished car.

"The work of construction will be completed as rapidly as possible. Installation of machinery will follow immediately."

TIRE CHAIN COMPANY FORMED

MILWAUKEE, WIS., Oct. 28—Articles of incorporation have been filed by the Auto-Life Tire Chain Co. The capital stock is \$25,000 and the incorporators are Fred A. Hoya, Jacob Best and Henry J. Keller. The company will manufacture and market a new design of non-skid chain device for pneumatic and solid tires which is claimed to protect the tread against abrasive action.

NEW TOP COMPANY HAS LARGE ASSETS

Has Acquired the Consolidated Company—Christian Girl Vice-President

CLEVELAND, Oct. 27—The General Top Co., with a capitalization of \$1,000,000, recently organized here, gives promise of coming at once into a place of unusual importance in the automotive industry. It is headed by men whose names and experience foreshadow for their product speedy recognition.

Christian Girl, president of the Standard Parts Co., is connected with the enterprise as vice-president, and C. R. Norton, for many years general sales manager of the Packard Motor Car Co., of Detroit, is mentioned as its president. T. E. Borton, of Borton & Borton, a leading banking and investment house of Cleveland, will be treasurer. Norman Elliott, of the former Consolidated Top Co., is secretary.

The General Top Co. has acquired the entire assets of the Consolidated Auto Top Co., together with patents held by that company and others and has approved plans for a large factory. It is intended that the proposed structures, adequate for large production, will be ready early in 1920.

The product of the General Top Co. is known as the Arcraft Top.

Pennsylvania to Open Atlantic City Salesroom

NEW YORK, Oct. 28—The Pennsylvania Rubber Co. has announced that arrangements have been completed for a large display and salesroom on the Garden Pier, Atlantic City, N. J. Five rooms have been leased on the northeastern end of the pier, and the company is planning to make this display one that will interest the thousands of visitors at the resort.

It is expected that the display will be opened about Jan. 1, under the supervision of C. B. Williamson.

British Farm Implement Engineers in Merger

LONDON, Oct. 8—(Special correspondence)—Quickly following the announcement of the amalgamation of the Ruston & Hornsby Companies, associated also with the Ransome, Simms & Jefferies Co., makers of the Ransome plow, one of the best known British makes, comes the news of a bigger combine, with a capital of \$15,000,000, comprising Aveling & Porter, Ltd., of Rochester; E. H. Bentall & Co., Ltd., of Heybridge; Blackstone & Co., Ltd., of Stamford; Richard Garrett & Sons, Ltd., of Leiston; and James and Fredk. Howard, Ltd., of Bedford.

The amalgamation will be known as "The Agricultural and General Engineers, Ltd." and the firms entering the amalgamation will in no sense lose their

identity, nor is the management to be changed, the whole object of the amalgamation being quantity production and efficient sales. The various works will specialize in their present chief products.

The Aveling & Porter Company has a specialty of steam road rollers, traction and other steam engines, and steam and gasoline machines. The Bentall Company makes oil-engines and cultivation implements, and, for a time, made a gasoline motor car. The Blackstone Company made kerosene oil-engines and recently introduced a kerosene tractor with direct start from cold by atomizing the fuel charge by compressed air. The Garrett Company is solely concerned with steam vehicles and traction and other engines, and in later years bought out a steam land tractor. The Howard Company concentrates wholly on land implements for horses. All these companies are among the oldest in the British industry.

Canada Offers Good Farm Tractor Field

OTTAWA, ONT., Oct. 25—The Canadian farm tractor industry will make rapid strides in the next year or two, if the statement of factory representatives at the recent plowing carnival in Ottawa are a criterion.

Announcement was made by the J. I. Case Co. that a large site had been secured at Port Arthur for a Canadian factory. This site has a large water frontage and it is apparently the intention to keep close touch between the American plant in Wisconsin and the Ontario factory by water.

The Cluff interests at Toronto, which were engaged largely with munition work during the war, have been transforming their plant into a tractor factory. One of the new models, the Chase tractor, was on exhibition and was demonstrated at the recent plowing meet. The Renfrew Machinery Co. also is planning to make similar arrangements. This concern will make the Canadian replica of a well-known American tractor, the Happy Farmer model, it is declared.

BUILDS NEW FREIGHT CARS

DETROIT, Oct. 25—The Olds Motor Works, of Lansing, has closed a deal for 89 specially built freight cars so constructed that automobiles may be loaded tilted and from four to six placed in one of the freight cars.

William P. Anderson, former general manager of the Wright-Martin Aircraft Corp., of New Brunswick, N. J., has been assistant general manager of the Olds Motor Works.

TIMKEN AXLE REDEEMS NOTES

DETROIT, Nov. 1—The Timken-Detroit Axle Co., in an advertisement in local newspapers, announces that on Dec. 1 it will redeem the 7 per cent serial gold notes due June 1, 1920, and June 1, 1921, the former at 100½ and the latter at 101, upon presentation at the Farmers' Loan & Trust Co., New York. The notes will cease to bear interest after Dec. 1, under an agreement entered into at the time of their issuance June 1, 1918.

TO MAKE MOTOR PARTS AT DAYTON

Plan Quantity Production of New Ohmer Products Early in 1920

DAYTON, Oct. 27—The Dayton Recording & Computing Co. has developed and started production on a line of magnetos suitable for motor cars, trucks and tractors, a starting motor for applying to the engine flywheel, and a combination generator with magneto and a separate generator.

The company has been developing these for two years and expects to be in quantity production by the first of the year. One of the large factories of the organization, which was used for munition work, is given over entirely to the manufacture of this equipment. Will I. Ohmer, president of the organization, has been connected with the manufacture of precision apparatus for 43 years. The company is aiming to produce the highest grade job possible.

Some of the magnetos have already gone through road tests of 8,000 miles. It is a compact four-cylinder and six-cylinder type of magneto, using a horizontal magnet. Another magneto line is the two-spark type using vertical magnets. The combination magneto and generator is a six-volt unit compactly designed with a generator horizontal and the magneto mounted vertical at the end.

By Jan. 1 the company will be producing 100 magnetos daily and by July 1 expect a capacity of 5000. It is now engaged in production on the four and six-cylinder magnetos with the horizontal magnets which are built in either single or two-spark jobs.

The generator-magneto machine is designed for battery equipment and also to give the magneto for ignition. If desirable, either the magneto or the battery system can be used separately for ignition, but not both together. There is a common distributor for the generator and magneto system. All of the apparatus is designed with S. A. E. bed plate dimensions and the feature is the extensive use of aluminum die castings.

SELDEN CORP. REORGANIZING

NEW YORK, Oct. 27—The Selden Truck Corp., according to Vice President H. T. Boulden, is reorganizing its sales and advertising department to take care of contemplated increased production.

E. A. Shelly, formerly in charge of sales promotion work of a well known Eastern truck manufacturer, will become associated with the Selden Company in its home office in Rochester as assistant sales manager, succeeding C. E. Williams.

The annual sales conference, to include division sales managers from all territories in the United States and Canada, has been called for the week of Nov. 15 in Rochester, N. Y., at which time definite plans and sales policies will be worked out for the coming year.

FORD BODY PLANT TO MAKE 2,000 DAILY

**Ford Employees Now Total
85,000 in U.S.—Car Production 3,100 Daily**

DETROIT, Oct. 28—The body plant of the Ford Motor Co., in operation in the buildings used formerly in the shipbuilding work, is destined to become one of the largest of its kind in the world. Evidences of the contemplated program everywhere are apparent, and the constantly increasing output bears out the statements of the officials of the company regarding the future.

An ultimate production of 2,000 bodies daily is the announced plan. Eight hundred daily are made at present. The plant was constructed for the building of Eagle boats for the government during the war, with the idea in view of transformation to a peace-time footing. The fact that it is not large enough to permit the construction of boats of great capacity resulted in the decision to transform it into a body plant.

Approximately 5,000 men are employed, but it is announced that this force will be increased to between 12,000 and 15,000 within the next six months. With 15,000 men in the body plant and blast furnaces, 55,000 in the automobile factory at Highland Park, 5,000 at the tractor plant at Dearborn, and approximately 10,000 in the various branches scattered throughout the country, Ford employees total approximately 85,000 in the United States.

At present the Fisher Body Corp. is making open and closed bodies for Ford to supplement the 800 open bodies manufactured daily at the Ford plant. The Wadsworth Manufacturing Co. will build the closed bodies as soon as its factory, destroyed by fire, has been rebuilt, and Fisher then will furnish only the open bodies necessary in addition to the Ford output.

The Ford Co., which began to equip cars with self-starters a year ago, using the output of the Liberty Starter Co., is making the "F.A." starter, named for the engineer who designed it. The starter plant, which was opened three months ago, is turning out 2,880 a day, according to officials. Ford has been unable to reach his schedule of 3,500 cars a day on account of his inability to get parts, but the production is being maintained at 3,100. The company is dependent on parts builders for batteries, bodies, windshields and tires, although it is manufacturing its own tires to a limited extent.

Urges Change in Date of Kansas City Show

CLEVELAND, OHIO, Oct. 27—It is possible that official approval will be withheld from the National Tractor Show at Kansas City unless the dates recently announced by Manager Guy Hall, Feb. 9 to 14 inclusive, are changed. These dates

are the same as those selected by the Wichita Tractor and Implement Club for its tractor and power farm equipment show to be held at Wichita. The show committee of the tractor division of the N. I. V. A. is bringing pressure to bear upon Hall to change the dates of his show.

The committee officially sanctioned the Wichita show at the time of the national tractor demonstration there last summer, the Wichita Club selected its dates and announced them at that time. No one seems to understand why the Kansas City show should have been set for the same time and the show committee is averse to placing its approval upon two exhibitions exactly similar in character and so close together geographically for conflicting dates.

Commerce Chassis Prices are Advanced

DETROIT, Oct. 25—The Commerce Motor Car Co. has announced increases ranging from \$70 to \$100, according to the size and type of tires, on Commerce truck chassis, beginning Nov. 1. Following is the schedule:

Model	Tons	Tires	New Price	Increase
E	1-1/2	Solid	\$1590	\$90
E	1-1/2	35x5, cord	1725	100
EP	1 1/2	36x6, cord	1965	70
EA	1-1/2	Solid	1655	90
EA	1-1/2	35x5, cord	1790	100
EPA	1 1/2	36x6, cord	2030	70
EH	1-1/2	Solid	1720	90
EH	1-1/2	35x5, cord	1855	100
EPH	1 1/2	36x6, cord	2095	70
ES	1-1/2	Solid	1745	90
ES	1-1/2	35x5, cord	1880	100
EPS	1 1/2	36x6, cord	2120	70
EF	1-1/2	Solid	1815	90
EF	1-1/2	35x5, cord	1950	100
EPF	1 1/2	36x6, cord	2190	70
ED	1-1/2	Solid	2015	90
ED	1-1/2	35x5, cord	2150	100
EDP	1 1/2	36x6, cord	2390	70

Cab tops will be sold at a list price of \$85, subject to regular discount.

British Car Club Defines Light Car

LONDON, Oct. 1 (*Special Correspondence*)—The Junior Car Club suggests that a light car should be defined (1) by having an engine whose cylinder capacity shall not exceed 1,500 c.c. for a four-stroke engine, and 1,100 c.c. for a two-stroke; and (2) that the weight unladen of the standard (as catalogued) open touring two-seater, equipped for the road, shall be 1,456 lb. and for a four-seater 1,680 lb.

Further, it is suggested that a cyclecar should be defined as a vehicle having an engine capacity of not exceeding 1,100 c.c. and a weight limit for a standard (as catalogued) open touring two-seater, equipped for the road, of 1,008 lb.

DYER BILL NOW EFFECTIVE

WASHINGTON, Oct. 27—The Dyer bill, which provides severe penalties for the transportation of stolen automobiles from one state to another, became a law Oct. 24. The bill was presented to the President Oct. 14, and without his signature, automatically went into effect Oct. 24.

RECIPROCITY BILL ENDORSED BY A. A. A.

Provides for International Plate of Identity as Well as Interstate Agreement

WASHINGTON, Oct. 27—Unlimited automobile reciprocity among the several states and the District of Columbia soon will receive the attention of Congress, as several bills on the subject have been introduced in both branches and have found places on the dockets of the Interstate Commerce committees.

In the House, its committee passes upon both interstate and foreign commerce, and because of this fact the reciprocity measure just introduced by Representative Burton E. Sweet of Iowa best meets the general needs of the situation. This bill has the endorsement of the American Automobile Association, which for a period of years has been seeking from Congress the "open door" in registration reciprocity.

Unlimited Recognition

Not only does Mr. Sweet's draft provide for unlimited recognition of registration numbers throughout the United States, but it also authorizes the Secretary of State to arrange with foreign nations so that any American going abroad can be equipped with a registration tag on which "U. S." will be substituted for the name of the state, and in consequence be acceptable in all European countries which are signatories in the use of the so-called "international plate of identity." This arrangement has been in existence in Europe for a period of years. It was somewhat interrupted by the war, but now to be resumed again, undoubtedly with a subsequent accompaniment in the form of an "international triptych," which will relate to customs duties.

Another excellent provision in Mr. Sweet's bill is that it definitely provides that the resident of any state temporarily located in the District of Columbia, either as a member of Congress or in any other governmental capacity, shall have the right to display on his motor vehicle a home state registration number which will be acceptable in the place of any other registration in the District of Columbia.

In the Senate

In the Senate, the Interstate Commerce Committee confines its activities to domestic matters, and this may mean that the question of international reciprocity cannot be taken care of by amending the bill of Senator Key Pittman of Nevada, which is a duplicate of the original Adamson draft. A separate measure may have to be passed upon by the Foreign Relations committee, of which Senator Lodge of Massachusetts is the chairman. Having in mind the many Americans who will go abroad next year, the convenience of this arrangement is plainly apparent.

GARDNERS PLAN TO RE-ENTER FIELD

Former Chevrolet Builders to Produce the Gardner Light Four in Quantity

ST. LOUIS, Oct. 27—The Gardners—Russell E. Gardner and his two sons, Russell E., Jr., and Fred W.—again will make automobiles. When the two young Gardners enlisted in the service of their country at the beginning of the war, their father, who said he was too old for active business, sold the Chevrolet Co. of Missouri, of which the family were owners, to the General Motors Corp. Soon after this sale, Gardner, Sr., exhibited the photograph of a \$1,000,000 check, which he said was in payment for his company.

Now that the young men are back from the service the family is again going into the vehicle manufacturing business.

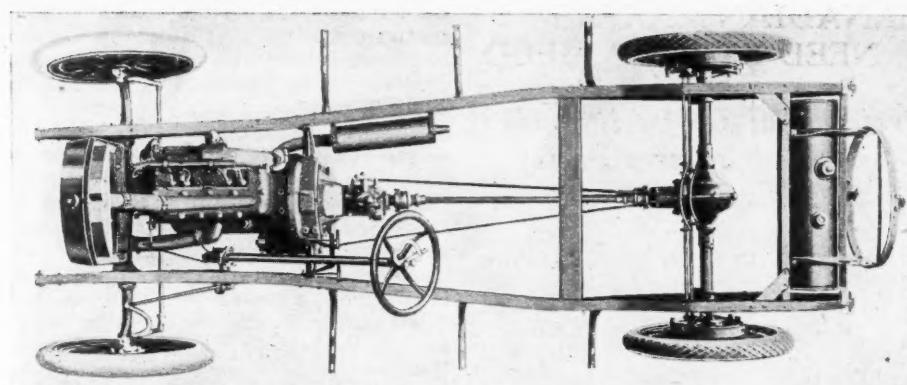
Their new product will be the Gardner Light Four. Test cars have been made at the Gardner experimental shop, 4300 Forest Park Boulevard, this city. They have been on the road for several months and the Gardners say they are entirely satisfied with them. They expect to have cars in production about Jan. 1. Their present plan is to produce 125 cars daily.

The return of the Gardner family to the vehicle industry is interesting to those who remember the days of the buggy. Russell E. Gardner came to St. Louis from Tennessee a poor young man, but was soon heard of in the buggy business. His factory became known far and wide because of its product, the Banner buggy, substantial, well-made and a standard for price of others. All through the Middle West, men selling buggies compared their products with the Banner and their prices likewise.

When the buggy business had such a marked decline that the Gardners could not hope to keep their factory going, they undertook to build bodies for the Chevrolet and then organized the Chevrolet Co. of Missouri and manufactured that car, for which they controlled all trade in the Mississippi River states. Gardner conducted a spectacular advertising campaign and his car was probably the first that was ever advertised in double-page spreads in the newspapers up and down the Mississippi River. He stuck close to business with his two sons until they entered Navy service. As soon as they were released they began designing the new car and worked in secret for a number of weeks, and, in fact, did not disclose their plans until a few days ago.

The company will build four styles of car, the roadster and touring car will be the first, for winter and early spring trade. The list price of each will be \$1125. By late spring the company will have the sedan and coupe in production.

The engine will be of four-cylinder, L-head construction, $3\frac{1}{2} \times 5$ in. The cylin-



Chassis of the new Gardner car to be built at St. Louis

ders will be cast in block, separate from the crankcase.

Other specifications follow: Westinghouse distributor and high-tension coil ignition; Westinghouse two-unit starting and lighting system, Willard battery; thermo-syphon cooling system, with extra liberal water jackets and oversize cellular type radiator with large four-blade belt driven fan; unit power plant construction transmission with center control, three speeds and reverse, nickel-steel gears and shaft, the main shaft mounted on annular ball bearings; Borg & Beck disk type clutch; propeller shaft fitted with double universal joints; floating type rear axle; Timken and Hyatt roller bearings, chrome nickel-steel drive shaft; drop forge I-beam front axle, chrome nickel steel spindles and steering arms, Timken roller bearings in wheels; semi-elliptic front and rear springs, vanadium steel, rear springs underslung; worm and full sector type steering gears, irreversible, with 17-inch walnut wheel, horn button on steering column; wood wheels, artillery type; straight-side demountable rims; $32 \times 3\frac{1}{2}$ tires, non-skid rear; 112 inch wheel base; black enamel body, hood and fenders finish, with wheels red; equipment includes tools, tire outfit, Stewart speedometer driven from transmission, electric horn, extra tire rim, dash light, etc.

Officers of the Gardner Motor Co. are: Russell E. Gardner, president; Russell E. Gardner, Jr., vice president for sales; F. W. Gardner, vice president for production; L. A. Moore, factory manager, and E. H. Behrle, treasurer.

J. & B. Manufacturing Co. Insures Employees' Lives

PITTSFIELD, MASS., Oct. 25—The J. & B. Manufacturing Co., makers of gasoline injectors and timers, has arranged with the City Savings Bank to insure the lives of its employees, the maximum policy being \$1,500. This insurance will be increased \$200 annually upon the anniversary of the employee's entry into the service of the company until the policy has reached \$1,500.

The following is the schedule, which is figured on length of service: Under one year, \$500; over one year and under two years, \$700; and over two years, \$900.

Officers of the company are: Edward B. Jacobson, president; George H. Southard, Jr., treasurer and general manager; Floyd A. Knight, sales manager, and Raymond D. Tufts, assistant treasurer.

NEW TRACTOR ON MARKET

NEW YORK, Oct. 28—The first of the new Traylor Engineering Co. tractors is expected to be on the market within a month. It is understood that the firm is preparing to expand this feature of business and to attain quantity production before the summer of 1920.

BIG SUIT AGAINST N. J. TRUCK CO.

Percy K. Hexter Claims Damages on Selling Contract —Counter Suit Filed

NEW YORK, Oct. 29—A suit in the United States District Court asking \$1,000,000 damages and an action in the New Jersey Chancery court demanding the return of 5,000 of capital stock are the result of a business breach between the Day-Elder Motors Corp., Irvington, N. J., makers of the D-E Worm Drive truck, and Percy K. Hexter, of New York, former sales manager.

The million dollar suit is directed against the corporation by Hexter, who claims that his loss, under the terms of the contract, would have reached that figure. In the Chancery action, the Day-Elder corporation seeks the return of the stock issued to Hexter conditionally, when he accepted the position of sales manager.

In his suit Hexter states that on Dec. 26, 1916, he contracted with the Day-Elder Co., as the company was then known, to sell its trucks. He established headquarters at 1457 Broadway, New York, organized his selling force and established agencies throughout the country. In September, 1918, he claims the contract was modified by mutual consent when he went into the army. Early last summer, it was resumed upon his discharge from the army.

A copy of the contract attached to the complaint shows that it was to run for three years from Dec. 26, 1916. A commission of five per cent was to be paid on all chassis sold. In addition Hexter was to be given 5,000 shares of stock in the new corporation, fully paid and non-assessable. When Hexter went into the army a new contract provided that he was to receive commissions of two per cent during service.

The break came when Hexter returned from the service and started to reopen his New York office. The firm is understood to have ordered him to do his selling from the factory, and upon his refusal, to have discharged him.

The suit filed by the corporation alleges that Hexter broke his contract with them.

CANADIAN MAKERS NEED EXPORT FIELD

Preferential Duties Extended by British a Large Factor in Industrial Growth

TORONTO, ONT., Oct. 23—The future of the motor car industry in Canada lies in the direction of larger export markets. It is principally by expansion in this direction that the Canadian industry and the home trade, as well, will benefit. Export trade has been a feature from the inception of the industry as a manufacturing proposition in Canada.

The preferential duties extended by other portions of the British Empire has induced a healthy trade that amounted to \$5,989,908 for the fiscal year ending March, 1919. The restriction of imports to Great Britain early in the current calendar year operated to the advantage of the Canadian industry. As a result of the stoppage of production of pleasure passenger cars in the United States during the latter stages of the war there has been an almost universal shortage which the manufacturers have not been able to overcome in all cases. Labor uncertainty has been a factor in limiting production during the last few months. There are reasonable grounds for believing that the automobile industry in general and the Canadian industry with the rest will experience more active conditions as a result of the removal of the war restrictions and the increased accessibility of overseas markets.

It is not generally known that full forty per cent of the production of the Ford plant in Ontario is for export. In the charter with which the Canadian was invested, the British Dominions markets were given to the Ontario company. This foreign business has been largely instrumental in reducing the item of overhead cost in manufacturing. It is stated definitely that the overhead cost in connection with the production of 50,000 cars a year in the Ford Ontario plant is no greater than for the making of 30,000 cars annually.

Production Costs

The making of the larger number of cars is attended with a much lower production cost per unit than is the case if the operations were limited. It is apparent from this that the sale of cars abroad is of considerable benefit to the Canadian purchaser. A statement was made recently that the motor car company in question received \$250,000 in drawbacks on materials imported from the United States. This was solely on automobiles and parts that were exported to the British Dominions.

A normal production at the Ford plant is estimated at 50,000 cars a year. This was attained in 1916; in the following year the volume fell to 40,000 and in 1918 it stood at 30,000. For the current year, it is probable that the output will reach about 60,000.

In the twelve months ending March, 1919, passenger cars valued at \$713,920

were made. The United States took 52 cars valued at \$39,295; Australia was the largest customer, with purchases of 4,080 cars valued at \$1,812, 690. A British South Africa firm bought 990 cars valued at \$484,139, and New Zealand took 1,599 valued at \$806,775. Other countries were importers of passenger automobiles from Canada to the extent of 3,431, valued at \$2,133,089. These figures make it apparent that the export of passenger cars has already reached sizable proportions; it is equally apparent to the trade that this business is capable of being materially extended. In addition to the above, there were 2,567 freight automobiles exported in the fiscal year ending March, 1919, reaching a total value of \$1,313,770. Automobile parts exported during the same period were valued at \$1,552,296.

The British market became very important from a Canadian standpoint when the restrictions prevented the importation of American automobiles into the United Kingdom. Quite an extensive trade was immediately diverted into Canadian channels that would otherwise not have been available. Lower production costs in the United States that cannot be attained in Canada on account of the smaller output prohibit export from the country to Great Britain, under ordinary conditions. For four months early this year, there were shipments of fully 1,000 cars a month to the United Kingdom, while the import restrictions prevented the shipment of American cars. The value of these cars would amount to about \$2,500,000.

Big International Tour Is Planned for 1920

DETROIT, Oct. 28—One of the largest international automobile tours of 1920 will be staged by the Michigan Pikes Association, covering approximately 1,400 miles in the United States and Canada. This was decided on at a meeting of the association in Detroit last week. The promoters of the tour plan to house and feed the party throughout the tour and where hotel accommodations are not available tents will be pitched. The route is from Detroit to Toronto, via Windsor and London; Toronto to Sault Ste. Marie, Ont.; Sault Ste. Marie to Jackson, Mich., via St. Ignace, Mackinaw City, Cheboygan, Grayling, Lansing, and from Jackson to Detroit. It is expected 30 to 40 touring cars and a dozen heavy trucks will be included.

SELLING FIRM ORGANIZED

NEW YORK, Oct. 28—The firm of Rost, Angstman & Griese, 1778 Broadway, has been organized to act as sales representatives for manufacturers of automotive products. The members are N. G. Rost, formerly associated with the Loew-Victor Engine Co., Chicago, and the Duesenberg Motors Corp.; Roger Angstman, of Detroit, and A. G. Griese, who has been identified with the sales department of the Winton engine works. At present the firm is handling sales in the New York district for the Winton marine motors, including the Winton Diesel type, and the new J. V. B. marine motor designed by Joseph Van Bleck.

NEW GRANT SIX GETS GOOD RECEPTION

First Model Shown in Cleve- land Creates Sensation— Improvements Noted

CLEVELAND, Oct. 28—Cleveland got its first glimpse of the new Grant Six on Monday when the handsome salesrooms of the Grant-Cleveland Co. were opened at 5017 Euclid Avenue. The Grant Six is the new model of the Grant Motor Co., and its coming has been awaited here.

The new car is considerably larger and built along what officials of the company say are more refined lines than old models. Everybody who knows anything about automobiles agreed that the new Grant is truly a fine car—fine mechanically—fine in performance and good looking. The new style radiator in harmony with the body of the car created much comment. The upholstery and cushions, done in leather, added a luxurious touch.

The specifications in brief are: Motor, six-cylinder, overhead valve type, 3½ by 4½ in. bore and stroke; Stromberg carburetor, Stewart vacuum system; two unit starting and heating system.

Axles, rear, Columbia floating type with 12 in. equalized brakes—one piece housing of exclusive design, 50 per cent stronger than conventional two piece housing; brake connections permanently lubricated. Front axle, drop forged I-beam.

Steering gear, irreversible, continuous jacketed tube, connections bushed.

Control, spark and throttle on 18 in. notched mahogany steering wheel. Extra long nickel plated emergency brake lever and extra long gear shift lever.

Springs, front, 38 by 2 in. semi-elliptic. Rear springs, underslung, permanently lubricated bushings. Extra strong deep frame. Ideal Hotchkiss drive.

Transmission, three speeds forward and reverse; speedometer drive from transmission; tubular propeller shaft; Spicer universal joints, Borg & Beck 10 in. dry disk clutch.

Radiator, reinforced double shell construction, removable core, latest design, black enamel finish.

Wheelbase, 116 in. Tires, 32x4 in. non-skid in rear, Firestone rims.

Top, one-man type with plate glass rear window and door opening curtains.

Body, beveled edge, upholstered in genuine leather, semi-bright finish. Outside nickel door handles. Finish, grand blue, black guards and fenders; wheels, white striped.

Equipment, complete including Boyce motometer and Kellogg power tire pump.

DECLARES EXTRA DIVIDEND

NEW YORK, Oct. 30—An extra dividend of 5 per cent has been declared on the common stock of the Savage Arms Corp. payable Jan. 15. The regular quarterly dividends of 1½ per cent on the common, 1¾ on the first preferred and 1½ on the second preferred stock also were declared.

FORDSON DEALERS TO SELL EQUIPMENT

Greatly Enlarged Selling and Service Force for Farm Tractor Field

CLEVELAND, OHIO, Oct. 25—While the Fordson distributors will lose control of the tractor by July 31, 1920, they will still retain control of the distribution of all of the farm operative equipment approved by Henry Ford. The Fordson tractor itself will be distributed through the Ford Motor Co. branch houses and will be handled as a Ford product exclusively by Ford dealers but the equipment lines will reach the dealers through the same channels of distribution as they have in the past.

It is the purpose of the Ford organization to make its selling organization the strongest and most aggressive in the tractor field. At the present time something like 4,000 Ford dealers handle the Fordson tractors, but it is planned to have the remaining 4,000 take it on within the next year. As these dealers will be expected to handle the approved equipment also, the result will be that 8,000 new implement dealers will be going after business by the end of another twelve months.

For the purpose of impressing the importance of handling the equipment lines in connection with the tractors, if they would be a success in the tractor business, meetings now are in progress at all the Fordson jobbing centers where the dealers are told that they must enlarge their activities by selling plows, harrows, drills and other things that make up a power farm equipment line. They are told that it is impossible to isolate the tractor and make a success of the business.

It is significant that practically the same thing is being done by the Cleveland Tractor Co., whose dealers recently have been called to central distributing points for similar advice and instruction. Inasmuch as the Fordson organization is exclusively automotive and the Cleveland organization almost nearly so, this means that several thousand motor car dealers trained to do business along modern lines and to charge for service will be actively engaged in putting power farm equipment on to the farms of this country. The result cannot be otherwise than to affect a virtual revolution along service lines.

Trailer Makers Meet— Discuss Conditions

NEW YORK, Oct. 27—The Trailer Manufacturers' Association of America held its October meeting here last week. The executive committee reported considerable improvement in trade, particularly since Jan. 1.

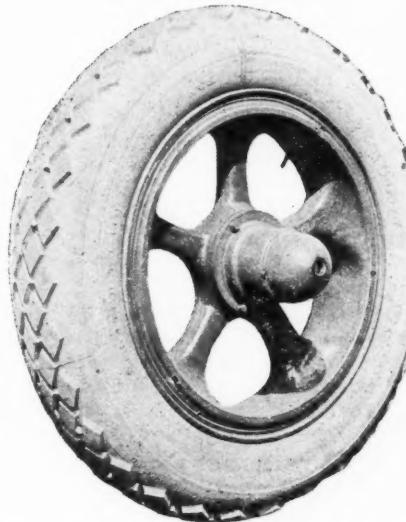
H. C. Freuhauf, of Detroit, and C. A. Geiger, of New York, were elected first and second vice president to fill the un-

expired terms of L. E. McGlaughlin and R. C. Sykes, resigned.

The association voted to co-operate with the Automobile Chamber, the Motor and Accessory Manufacturers' Association, the American Automobile Association and the National Automobile Dealers' Association in conferences during the winter on matters of legislation affecting highway improvement, automobile thefts, regulation of the use of automobiles, motor trucks and trailers of all types.

The annual meeting in January will be held in this city during the week of the national automobile and motor truck shows.

Steel Wheel for Pneumatics



Electric furnace steel, with the hub cast integral, is used in the new Dayton steel wheel for pneumatics. A special slot is provided in the rim for the air tube of the tires, which may be slipped off easily and without difficulty

U. S. Plans to Purchase Big British Dirigible

WASHINGTON, Oct. 27—The United States will purchase one of the largest dirigibles manufactured up to this time, from England. The ship is the R-38, a sister of the R-34, according to information made public today by Secretary Daniels. Congress has appropriated \$2,500,000 for the purchase of this dirigible, for the construction of the hangar, and for the training of the crew. The hangar will be built at Lakewood, N. J., according to present plans.

The R-38 will be 694 ft. in length, 86 ft. in diameter, 93 ft. 6 in. in height and will be able to carry a useful load of 45 tons. The C-5, which was wrecked in attempting a flight to Europe, was only 195 ft. in length and 54 ft. in height.

It is expected that the new ship will be capable of a speed of 60 knots—which is considerably more than 60 miles an hour. When full of gas, she will have a capacity of 2,724,000 cu. ft., which is fifteen times that of the C-5.

TRUCK SHORTAGE FELT IN BRITAIN

Railway Strike Emphasizes Need for National Motor Transport System

LONDON, Oct. 1 (*Staff Correspondence*)—By a curious and even deserved irony, it has happened that within seven days after receiving a marked rebuff at the hands of the president of the Board of Trade, in answer to their request for a ban on truck and tractor implements, the British trade should be faced with the problem of having to find trucks to fight the national railway strike.

So large is the need that probably 10,000 additional 6,000 to 7,000 lb. trucks could be usefully employed just now, for practically all traffic has to be carried on road vehicles, of which about 5,000 are in use. This strike, so far as concerns the truck problem, has justified the Government's much criticised repair scheme at Slough, of which note has been made in *Automotive Industries*.

Had the Government accepted the truck makers' half-hearted offer to repair the demobilized motor transport and other war trucks, on their own terms, the probability, almost the certainty, is that the shortage would have been several thousands more, for at present Slough, under S. A. Wallace's control, is turning out about 400 repaired trucks weekly, not to mention motorcycles and other vehicles.

The largest British truck works' output of repaired vehicles would not have exceeded 10 a week, and the total for a dozen truck works would have been not more than 50 to 60 vehicles a week. There are still some 30,000 trucks to pass through Slough for repairs. A few days ago there were approximately 6,000 trucks and 10,000 motorcycles in the depot. The light-car shop has just been put in hand, and soon the output will reach 50 a week, increasing rapidly. About 5,000 workmen are employed. In about four months' time, when the buildings are complete, the output is expected to reach 100 repaired vehicles a day.

The strike should give an immense fillip to the truck trade, for it is giving all concerned the right sort of experience for organizing a national system of motor transport, to the relief of the railways. In the ordinary course of events it would probably have been three to five years before the use of trucks would have attained its present size.

Great Britain is particularly short of 2,000 to 3,000 lb. trucks suitable to run on pneumatic tires and there seems to be a larger field for many trucks of light weight than for trucks of twice and treble that weight, because, apart from the strike, the trend is toward smaller loads and faster speeds. The pneumatic tired truck will be given the preference by the road authorities, and the law permits it to be run at about 50 per cent faster than other models.

FOREIGN CARS SHOWN BY NEW YORK DEALERS

Expect Five Fiats This Month —Two Sunbeams on Way From England

NEW YORK, Oct. 27—Foreign cars are beginning to make their appearance in the sales rooms of New York. The first Fiat chassis arrived this week and is being shown on the floor of the Premier agency on Broadway, which is now taking orders for October and November delivery.

It is expected that at least five Fiats will be received here this month, including one or two cars complete, with bodies built at the Italian factory, the others chassis only. The chassis received here and those already consigned to the Premier agency are of the Fiat model 20, five passenger.

The Fiat on display here is listed at \$5,280, and as it is intended for a town car body which will cost \$4,000 to \$4,500, the retail price, with war tax added, will be in the neighborhood of \$10,000. The Fiats consigned with bodies built in Italy will be sold at \$7,500 f. o. b. New York, war tax to be added. Dario Resta, the former racing driver and representative of the Sunbeam in this country, announced today that two Sunbeam chassis have been shipped from England. He has established a sales room on West Fifty-fifth Street, near Broadway, and expects shortly to be able to take orders for early delivery.

House Bill Provides Wright Plant Purchase

WASHINGTON, Oct. 25—The purchase of the Dayton-Wright airplane factory and plant, Dayton, Ohio, for not more than \$390,000; the land adjoining the plant known as Acceptance Park, together with buildings erected on it, for \$1,066,636.94, and other adjoining land for \$519,648.50, all to be used as an aeronautical experimental development and engineering plant for the United States Air Service, was authorized in a bill introduced into Congress by Congressman Julius Kahn.

The bill would also appropriate \$1,129,500 for necessary construction work, \$200,000 for one hangar and \$375,000 for another.

Federal Aid Roads To Get \$9,814,599

WASHINGTON, Oct. 24—Two hundred and twenty-six Federal Aid road projects and agreements were asked by the various states in July, involving 1,636.3 miles and costing \$26,849,264, of which \$9,814,599 will be paid by the government under the Federal Aid Road Act. Two hundred and thirty-four projects and agreements were approved in August, involving 1,944.4 miles, costing a total of \$30,397,337, of which \$12,362,585 will be paid by the government.

Features of the approvals in these two months were three road projects to cost over \$1,000,000 each, one of them over \$2,600,000. Arkansas will construct a road 153 miles long from Grady to the Louisiana line, to cost \$2,684,177, of which \$332,000 will be paid by the government. Indiana will construct a road 40 miles long of concrete, brick or asphalt in Johnson and Bartholomew counties, to cost \$1,353,330, or \$33,830 a mile. The federal allowance is \$676,000. Kansas has constructed a road 20 miles long in Lyons County, costing \$1,131,539 or \$55,330 a mile, of which \$306,750 will be Federal aid.

Up to and including Aug. 31, the Bureau of Public Roads has approved 1583 road building projects, of which 826 have been executed. The approvals cover 15,124.82 miles, whose estimated cost is \$172,248,883, with a Federal allowance of \$70,800,791. The agreements executed cover 6,908.34 miles, for which Federal aid was allowed to the amount of \$32,069,204, on an estimated cost of \$75,314,016.

In July, 144 Federal aid projects were approved.

Senate Authorizes Transfer of Vehicles

WASHINGTON, Oct. 28—A bill authorizing the War Department to transfer free of charge surplus army vehicles to the Departments of Agriculture, Post Office and Treasury has been passed by the Senate.

The bill authorizes the Secretary of War to transfer the vehicles to the various departments, making requisitions for them, and he may also turn over to the Department of Agriculture all surplus road-building equipment, including sprinkling wagons, concrete mixers and excavators.

The various state highway departments which receive motor vehicles may arrange with state agencies or municipal corporations for the construction and maintenance of public highways and rent the vehicles to them at not less than the cost of maintenance and repair on the trucks or cars, but the title to the vehicles will remain vested in the State, for use in the improvement of public highways.

NEW BRASS FOUNDRY COMPANY

MILWAUKEE, WIS., Oct. 25—The Superior Brass Foundry Co. is the name of a new corporation here, which is establishing a foundry and machine shop to manufacture brass and bronze specialties and parts. The incorporators are Phillip Leehler, Frank Schedeler and W. H. Wheeler. The capital stock is \$25,000.

M.A.M.A. SANCTIONS BOSTON SHOW

NEW YORK, Oct. 27—The Motor and Accessory Manufacturers Association has issued a sanction for the proposed Boston show. This organization participates in the New York and Chicago shows, but does not have anything to do with any others, except the Boston exhibit.

Darracq-Talbot Car Companies Combine

LONDON, Oct. 8—(Special Correspondence)—The recently reported intention to combine the Darracq (French) and Talbot (British) companies was confirmed today. The combined capital is about \$2,500,000.

It remains to be seen whether this amalgamation will affect the Talbot program of output, which, so far as can be learned at present, is to be limited to a 12 h. p. model for the 1920 season. Since the war, the Talbot company have been building a few cars of their pre-war Twelve and Twenty-five four-cylinder models, although listing also a third model with six cylinders. Modifications had been made in the engines chiefly to improve output and reduce weight of the reciprocating parts, but virtually the models have been built of pre-war stock.

Particulars of the new real post-war Talbot car have not been disclosed to the press, but it can be stated that the new chassis, designed by a young Swiss-French engineer, Mr. Roesch, is particularly neat and attractive. As it is a type likely to be much in vogue in Europe, The Fiat, De Dion, and Charron Companies are introducing cars on similar lines. It may be stated that it has a four en bloc engine, combined with special clutch and four speed gear box. The magneto is diagonally bolted directly to the side of the engine for easy access, and has a bevel-gear axle. The frame is light but strong, and there is a big shallow enclosed pan underneath, which is to be used for storing tools and a spare wheel and tire. The gear change is particularly neat and easy. Reports are out that it is exceedingly fast and "accelerative." The bore and stroke is about 70x120, but these figures are given with reserve.

STUDEBAKER STOCK INCREASED

NEW YORK, Oct. 28—Stockholders of the Studebaker Corp. will be asked to approve a directors' resolution passed today to increase the common stock from \$30,000,000 to \$75,000,000.

It is proposed to offer \$15,000,000 of the new stock to shareholders at \$105 a share. This will place the company in funds to pay off an issue of \$15,000,000 serial 7 per cent notes, now outstanding, and still leave about \$750,000 for working capital. The new stock issue, which is to be underwritten by Goldman, Sachs & Co. and Lehman Bros. will be available to stockholders on Nov. 29.

In announcing the new financing, President A. R. Erskine said that the company would turn out about 40,000 cars for 1919. He said that the net profits would equal the best previous record despite wage advances of 30 per cent since the signing of the armistice.

REYNOLDS TRUCK CO. FORMED

DETROIT, Oct. 25—The Reynolds Motor Truck Co., capitalized at \$200,000, has been formed at Mt. Clemens with Louis C. Wolff, Mt. Clemens, president and plans are under way for the immediate erection of a plant.

ENGINEERS TO AID ORDNANCE WORKERS

Automotive Industry Co-operates in Designing and Building Motorized Artillery

NEW YORK, Oct. 29—Motorization of artillery has brought the Ordnance Department of the United States Army in close touch with the automotive engineers of the country.

The policy of the Ordnance Department in its development and production work is to secure the advice and assistance of the industry and this has been provided for, in a great measure, by its co-operation with the Society of Automotive Engineers, many of whose members worked with the Ordnance Department during the war. Individual engineers have been asked to submit designs for automotive ordnance equipment. Later, bids will be solicited for the production, at first, of samples of approved designs.

In order to bring about closer relations between the automotive engineers and the Ordnance Department, designing offices have been established at Syracuse, Cleveland, Detroit and Peoria. A permanent exhibit of ordnance material, where automotive engineers may inspect samples of motorized apparatus, is to be maintained at Aberdeen Proving Ground.

A committee of the Society of Automotive Engineers is now working with the Ordnance Department and will hold meetings regularly for the purpose of formulating advisory recommendations and considering engineering questions. A recent meeting of the committee, held in Washington, was attended by Maj.-Gen. C. C. Williams, Chief of Ordnance; Brig.-Gen. S. D. Rockenback, Chief of the Tank Corps; Col. C. L'H. Ruggles, Chief of the Technical Staff of the Ordnance Department; Col. L. B. Moody, Col. James B. Dillard, and the following members of the S. A. E. committee: Herbert W. Alden, chairman; W. G. Wall, Dent Parrett, G. W. Dunham and Coker F. Clarkson. President Charles M. Manly and Past President C. F. Kettering, of the Society, are members of the committee.

OLDS MOTOR WORKS HAS SERVICE SCHOOL

LANSING, MICH., Oct. 29—The Olds Motor Works will begin next week a school for service managers, 600 employes of the country having been summoned to attend in three classes of one week each. Problems of the service department and the best methods of handling the business and the public will be discussed and ideas interchanged on the practical operation of the station. The company will furnish various entertainment features for the "students" during their stay in Lansing.

The new closed car factory, with 98,600 sq. ft. of floor space, is in full operation, and 100 cars are being turned out daily. The force of employes is being

increased as rapidly as possible, and additions completed and contemplated will increase the employees roster approximately 3,000 within the next five or six months.

An evidence of the rapid growth of the plant is shown in the fact that the street railway company is building two extensions into the factory, one designed to handle the passenger traffic and the other freight. The railroad freight congestion has made some such step necessary and the electric line will relieve the railroads of much of the burden.

Avery Co. Service Men Attend Tractor School

PEORIA, ILL., Oct. 27—Inspired by last year's success, the Avery Co. is opening again a series of tractor service schools. The schools, which begin at the Avery factory here this week, will be held in various cities and are intended primarily to train the dealers and their service men that they may handle all demands for service without resorting to the branch houses or factory.

This week's school, at the factory, is in charge of L. R. Van Valkenberg, service engineer of the company. Service men called in from all of the branch houses are in attendance. The course combines classroom instruction, lectures and practical shop work in the factory.

Van Valkenberg is introducing a novelty this year by employing a free hand artist to give instruction in blackboard work. The service engineer says this method of instruction is much more satisfactory than the use of lantern slides, blue prints or completed designs. He explains that the very process of putting the design on the board emphasizes not only its manner of construction, but its functions. Besides, many of the service men gain experience in handling chalk, and do the same thing for the dealers.

Following the schools this week, schools will be held at each of the branch houses under the direction of the branch house service managers. Avery tractor owners and prospective owners will be invited to these schools, which will continue until early next spring. The result of the schools held during past years has been so marked in reducing the cost of service that the company feels the elaborate course now under way will be a profitable investment.

Several other companies, including the J. I. Case Plow Co., are understood to be planning similar courses of instruction.

TIRE CO. INCREASES CAPITAL

NEW YORK, Oct. 28—Announcement has been made in financial circles that the Lee Tire & Rubber Co. plans to increase its working capital \$1,500,000.

Of the new 50,000 shares to be issued, 40,000 have been underwritten by Hornblower & Weeks at \$30, and will be offered to holders at \$33. The remaining 10,000 shares will be offered to the employes under a profit sharing plan, the stock being held in trust for three years and the employes having five years to pay for it.

Society Will Promote U. S. Trade in Spain

WASHINGTON, Oct. 27—A society for the promotion of American markets in Spain under the name of Sociedad Americana de Expansion Commercial has been founded in that country and will hold four permanent expositions for the products of American manufacturers who desire to exhibit their goods. The society will provide information including freight rates, methods of payments, etc., to prospective buyers, and, in addition, will carry on an active trade campaign by means of pamphlets and advertisements in the papers of large circulation. It will publish a bi-weekly review devoted exclusively to spreading information in the Spanish markets concerning the merchandise exhibited in the various show rooms which should represent many fields, including the Automotive.

Four offices will be established, according to a report by Commercial Attaché C. L. Jones, in leading provinces of the country, namely, Barcelona, Madrid, Seville and Bilbao. The central office is located in Seville, to which all correspondence should be sent in care of the director, Andres Lopez Pardo, Director Tecnico, Central de Sevilla, Jesus del Gran Poder, 82, Seville, Spain.

CLOSES CHICAGO OFFICE

MILWAUKEE, Oct. 28—The National Association of Motor Truck Sales Managers, which has maintained a Chicago office during the past few months to direct the recent Middle Western truck tour, has closed that office and is now handling all its activities from the headquarters at Milwaukee. J. M. Carney is in charge as executive secretary and will handle all business.

DORT OPENS CLUBHOUSE

FLINT, MICH., Oct. 25—The Dort Motor Car Co. has opened a clubhouse adjoining its factory for the use of employes in a three-story structure, 100x160 feet. A dining room and ball room are on the first floor and lounging and reception rooms for women on the second floor. The third floor is given over to the exclusive use of the male employes.

CAMP HOLABIRD SALES

BALTIMORE, MD., Oct. 27—Price records were smashed at Camp Holabird recently when 222 unserviceable army motor vehicles were sold for a total of \$122,000.

Many out-of-town bidders, some from as far west as Iowa, kept the bidding brisk. A White truck, which sold for \$2,200, brought the highest price during the sale.

The eighth and ninth sales are scheduled for Oct. 30 and Nov. 6. Among the 200 vehicles to be offered are Dodge, Hudson and Hupmobile passenger cars, and Ford, Garford, Denby, F. W. D., Heavy Aviation, Light Aviation, Pierce-Arrow, Kelly-Springfield, Kissel-Kar, Lippert and Stewart trucks are included in the coming sales.

GOVERNMENT ASKED TO SET TRACTOR TEST

Manufacturers Seek Uniform Drawbar and Brake Specifi- cations—Favor Farm Power Survey

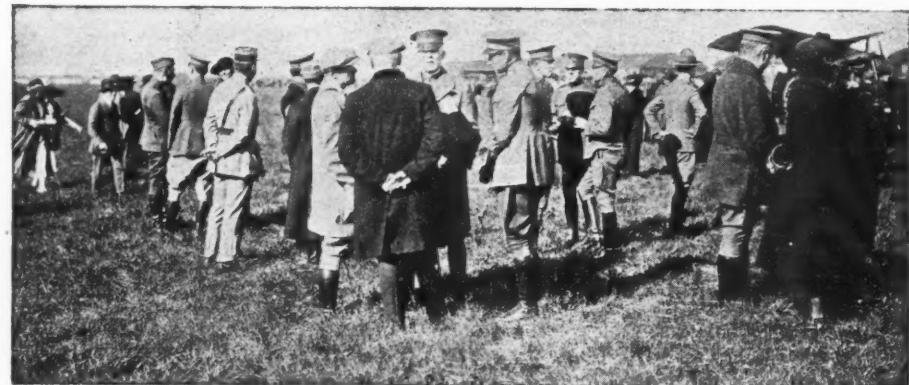
CHICAGO, Oct. 24—Tractor manufacturers have put the matter of official drawbar and brake tests of tractors up to the United States Department of Agriculture. A resolution embodying this request is one of the results of the Farm Power Conference held here at the call of Secretary Houston.

The conference was called for the "confidential information" of the department and practically nothing has been given out regarding the two days' sessions. A set of resolutions recommending certain lines of investigation to be undertaken by the department was adopted and this has gone to Secretary Houston for his consideration. Among the resolutions was the one calling on the department to undertake tractor tests and to authorize official ratings which should be recognized as such throughout the country.

The request was preferred by the tractor manufacturers attending the conference, as a measure to forestall certain threatened legislation by a number of states similar to the tractor test ruling passed last spring by the legislature of Nebraska. The Nebraska law provides that no tractor may be sold in Nebraska until a sample machine has been tested by three competent engineers of the State University at Lincoln, who shall report to the State Railway Commission. The commission will compare this report with the specifications and claims of the manufacturer or agent as set forth in advertisements or sales arguments and will deny permit for sale if these specifications or claims are found to be false in any way.

Already something like \$30,000 has been expended by the state university in preparations to undertake the tests, which actually will begin within the next 60 days. In the meantime, temporary permits have been issued to the tractor companies, under which they now are selling, provided they conform to the second section of the law which demands that an adequate stock of repairs and parts be carried by the company at some point in the state.

Tractor manufacturers fear similar legislation in many states and, in order to escape the heavy expense that would be involved and to avoid the possibility of numerous state official ratings, which necessarily would conflict because no two of them would be made under the same conditions, they are anxious to have the government establish an official testing station and establish official ratings which will be recognized everywhere. It is understood the department would have to be authorized to undertake this work by special act of Congress and a special



When They Hopped Off at Mineola

General Mitchell and General Duncan (in overcoat) chatting on Roosevelt Field, L. I., just before the beginning of the Trans-Continental Derby

appropriation also would be necessary to cover the expense. The resolution suggests that proper representations be made to Congress to bring this about.

The conference was attended by representatives of the Department of Agriculture, including officials from the offices of Animal Husbandry, Rural Engineering, Good Roads and others; tractor manufacturers; agricultural college professors; agricultural and agricultural research engineers; representatives of national associations such as the Saddlery, Hay and Feed Dealers, Horse Breeding Associations and plain farmers. The avowed object of the conference was to consider ways and means whereby all the sections of the Department of Agriculture and the other interests represented might co-operate in an investigation of farm power, meaning by that both animal and mechanical power, to the end that an economic basis for the estimation of farm power needs might be established.

Individual expressions of opinion by delegates were to the effect that something constructive had been started and that for the first time harmonious co-operation of all the factors interested in the problem seemed likely. Also it was decided that the tractor had a very definite and distinct place upon the farm, but that a more efficient use of horses might also be recommended so that existing investments in horse breeding and ownership might not be adversely affected.

Behind all this is a hope that the importance of the farm power matter be so impressed upon Congress that larger appropriations for the use of the department may be secured.

SPRAGUE TIRES INCREASED

OMAHA, NEB., Oct. 25—Increases of \$3.55 on rib fabric and nonskids, and \$5.97 on cord tires were announced in the new consumers' rate card issued by the Sprague Tire & Rubber Co. The tube prices remain the same. Absence of quoted prices on plain tread tires indicates the discontinuance of this product by the Sprague company. The revision is the result of construction changes.

AIR RULES COMMITTEE APPOINTED BY BAKER

To Draft Regulations Governing Aeronautics—the Personnel

WASHINGTON, Oct. 25—A committee has been appointed by Secretary of War Baker, at the direction of the President, to draft regulations covering air navigation in the United States. The committee is composed of: Col. J. F. Curry, representing the War Department; Comdr. J. L. Callam, Navy; Capt. S. V. Parker, U. S. C. G., Treasury; W. C. Carpenter, State Department; Prof. C. F. Marvin, Agriculture; Otto Praeger, Post Office Department; Dr. S. W. Stratton, Commerce Department; John D. Lennon, Labor Department, and Joseph S. Ames, National Advisory Committee.

The committee held its first meeting Tuesday last, at which time several of the conferees urged the formulation of an act which would create a department of aeronautics somewhat similar to that suggested by Automotive Industries in a recent issue. The recommendation came as a result of the wording of Secretary Baker's letter which asked the committee to "draft an act covering air navigation and civil aviation in the United States." Other members of the committee, however, who apparently came with instructions from their various departments, stated that it was not the intention to create a department of aeronautics, but merely to create an act containing regulations for control of aviation in this country to prevent the inauguration of individual state legislation.

It is the plan of these members to have an act passed and the executive control of the regulations placed in some department.

DIVIDENDS

The Mullins Body Corp., Salem, Ohio, has declared a dividend of 75 cents a share on common stock and \$2 a share on preferred stock, payable Nov. 1.

BRITISH OUTPUT TO BE 17,000 TRACTORS

Details Received of Makers' Conference Urging Ban on American Car Imports

NEW YORK, Oct. 27—English tractor manufacturers expect to attain a production of at least 17,000 machines yearly before the end of 1920, according to statements made by Sir Auckland Geddes, president of the Board of Trade. London newspapers, greatly delayed because of the recent railroad strike in Great Britain and received here recently, gave detailed accounts of the meeting with the Board of Trade head, a deputation of British manufacturers asking that tariff and import restrictions be placed upon the shipments of American-made cars, trucks and machines.

Cable dispatches, previously published in *Automotive Industries*, told the results of the meeting immediately after its occurrence. These were that Geddes refused to countenance any change in the present British policy regarding the American importations. The newspaper accounts, however, were thought to be the first detailed statements of the conference yet received in the United States.

The manufacturers, who were members of the Association of British Motor and Allied Manufacturers, Ltd., were headed by H. C. B. Underdown, of Commercial Cars, Ltd. Others who attended the conference were A. Sparrier, Leyland Motors, Ltd.; G. M. Young, Albion Motor Car Co., Ltd.; W. R. Shephard, Daimler Co., Ltd., and R. Dennis, Dennis Bros., Ltd., representing truck makers. The tractor industry was represented by George Wood, Saunderson Tractor & Implement Co., Ltd., Sir Herbert Austin, Austin Motor Co., Ltd., and G. Pollack, Crawley Agrimotor Co., Ltd.

Wood, speaking for the tractor makers, declared that production plans made before the armistice were now beginning to mature and that a considerable production might be expected shortly provided foreign competition did not hamper. A probable demand of 50,000 machines during the next five years was predicted for the British Isles. The promised British production of 17,000 tractors yearly, in Woods opinion, would more than fill the expected demands.

The truck makers' case was presented by Underdown and Sparrier. The former declared that prices on automobiles were showing an indication of a downward trend, practically because the military disposal board had at least 35,000 vehicles to be sold to the public. These machines were said to be of 3½-ton capacity and were sufficient in number to meet present demands except as regards lighter types, for which there seemed to be a temporary deficiency. Sparrier declared that the type most required at present was the four-ton government vehicle wanted for railway and freight transport. He thought the government might place 15,000 such machines on the market, caus-

ing a price drop of about 100 guineas on each machine. The prices for commercial cars were high about two months ago, he said, but the average price recently had dropped to 270 guineas.

The meeting brought out that present import duties on passenger cars were thirty-three and one-third per cent, whereas trucks and tractors were free from duty.

U. S. Army Motor Car Sale Held in Paris

PARIS, Oct. 16—(Staff Correspondence)—The first sale of American army automobile material was held here Oct. 14. It comprised 100 Harley-Davidson and Indian motorcycles. These machines were being offered for sale by auction by the French Government which has acquired the whole of the American army supplies.

It is announced that the first sale of American army trucks and passenger cars will take place on an early date. The whole of this material is under the care of French guards.

International Bureau of Makers Formed

NEW YORK, Oct. 27—The National Automobile Chamber of Commerce is the American member of a permanent association of automobile manufacturers of the United States, Great Britain, France, Belgium and Italy recently formed with headquarters at Paris. The association is known as the Bureau Permanent International des Constructeurs d'Automobiles.

The purposes are to study jointly questions concerning the development and prospects of the automobile industry.

\$1,000,000 Concern

to Build New Motor

MILWAUKEE, WIS., Oct. 24—The Balance Valve Motor Co. of Milwaukee, Wis., has been incorporated with an authorized capital stock of \$1,000,000 to manufacture a new design of internal combustion engine perfected by W. M. Baumheickel of Milwaukee and George Rusco and Elmer B. Eberhardt of West Bend, Wis. Details of the design are as yet kept secret. It is proposed to establish a plant in Milwaukee to manufacture the engine on a commercial basis.

Record Production

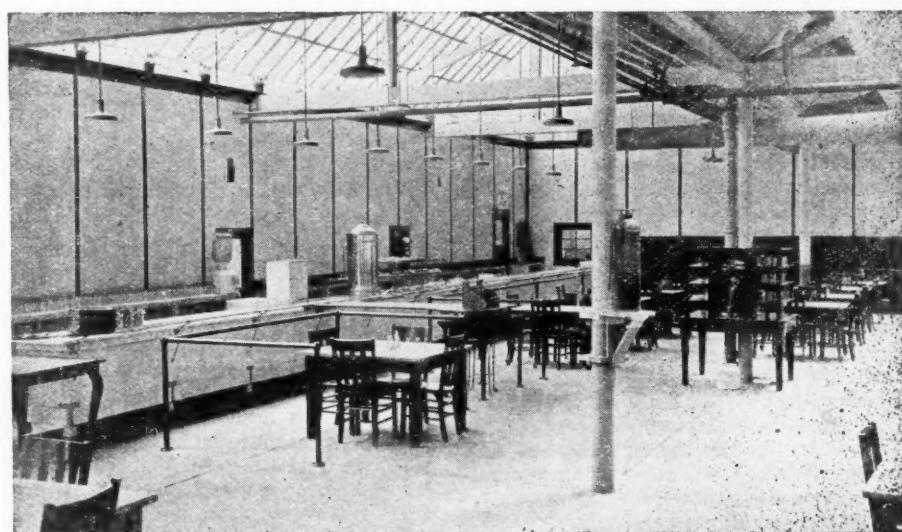
at Reo Truck Plant

LANSING, MICH., Oct. 25—With 100 trucks coming off the assembly chains, the Reo Motor Car Co. Wednesday established what is believed to be a record in a nine-hour working day for any single truck model. Sustained effort to meet the remarkable country-wide demand for the truck, rather than a desire to establish a record, was responsible for the result. Despite the increased facilities, the company is far behind the demand and further additions to meet the growing business are contemplated. The freight car shortage has not interfered with delivery, fleets of machines going over the road to the far south, the New England states and into Canada.

ROYAL OAK TIRE DIVIDEND

TORONTO, Oct. 25—The directors of the Royal Oak Tire & Rubber Co. have declared a quarterly dividend of 1½ per cent for the period ending Sept. 30, payable Nov. 15.

Mitchell Workers Have Lunch Room



"Responsibility to the workman does not end at the pay envelope," says the Mitchell Motors Co., Inc. So they have added to their other comforts for the employees a modern cafeteria. A usual dinner consists of choice of meats, potatoes, another vegetable, dessert and coffee or milk. All bread, rolls and pastries are made on the premises, and folks say they're "like mother used to make." Prices cover only the cost of raw materials and preparation. The cafeteria has developed so much good will, and is having such a beneficial effect on shop morale that the company feels it is a distinctly profitable investment.

Anthony Named General Manager for Packard

PHILADELPHIA, Oct. 25—Walter Y. Anthony, for many years a prominent executive of the Packard Motor Car Co. of Philadelphia, and assistant general manager since 1916, has been promoted to the office of general manager to succeed Lee J. Eastman, recently elected president and general manager of the Packard Co. in New York. Mr. Anthony joined the Packard forces in 1909. An organization banquet to celebrate Mr. Eastman's farewell and Mr. Anthony's accession will be held at the Bellevue-Stratford Hotel Oct. 28.

Albert H. Mitchel has become associated with H. W. Cottin, Inc., of Brooklyn, N. Y., as vice president and general sales manager, with headquarters at their New York office in the Woolworth building. Mr. Mitchel was formerly with Taft Pierce Mfg. Co. of Woonsocket, R. I., for the past nine years, having been with their engineering department at Woonsocket, after which he entered the sales department as Chicago representative. For the last five years he has been at their New York office as district sales manager.

A. Brauer, body designer of the Mansfield Steel Corp. of Detroit has been made assistant general manager in charge of production, quantity surveys and production engineering.

Parke Ross, who has been in charge of sales for the Elgin Motor Car Corp., Argo, Ill., for more than a year, will after Nov. 1 be connected with the Dupont Motor Manufacturing Corp. of Wilmington. Mr. Ross will be treasurer of the Dupont company and will also have direct supervision of sales.

Edward R. Abbot has joined the sales force of H. W. Cottin, Inc., of Brooklyn, N. Y. He will have charge of the Western business, making his headquarters for the present in the Woolworth building, New York, and later at Cleveland. Mr. Abbot was formerly with the Taft Pierce Mfg. Co. of Woonsocket, R. I., as a member of the sales force of their New York office for several years.

Albert H. Zimmerman, who for 14 years has directed the destinies of the Continental Motor Co. of Detroit, has severed his connection with that corporation and has associated himself with the new \$2,000,000 Supreme Motors Co. of Warren, Ohio, in the capacity of vice president and general manager. Mr. Zimmerman has purchased a large interest in the new Supreme Motors Co.

James Guthrie, consulting motor vehicle engineer of Cleveland, and former ordnance engineering representative in the Michigan district, has been commissioned a lieutenant colonel in the Reserve Corps of the U. S. A. Guthrie was formerly a major in the old reserves and served through the war with the same rank.

Men of the Industry *Changes in Personnel and Position*

Col. W. B. Brinton, for many years president of the Grand Detour Plow Co., has been elected a director of the J. I. Case Threshing Machine Co., Racine, Wis., and vice president in charge of the Case Company's Grand Detour plow division. In 1905, Colonel Brinton sold out his interest in the Peru Plow & Wheel Co., of which he had been president for a number of years, and acquired a controlling interest in the Grand Detour Plow Co. He has served as president of this company since his first association with it. He also served as president of the National Implement and Vehicle Association and for several years he was a member of the board of directors of the Avery Co. of Peoria, Ill., a position he resigned on being elected a director of The J. I. Case Threshing Machine Co. Colonel Brinton will look after the interests of the Grand Detour Plow Co., which is operated in Dixon, Ill., as a branch of J. I. Case Threshing Machine Co.

H. W. Ross has been elected vice president of Templeton, Kenly & Co., Chicago, makers of the Simplex jack.

George Carlson, traffic expert at the Portland branch of the Ford Motor Co. has been promoted to be assistant manager of the new Ford assembly plant at Copenhagen, Denmark. This plant will distribute Ford cars in Denmark, Sweden, Norway and Western Russia. Carlson's proficiency in the Danish and Swedish languages was one factor in his selection for the position.

Lieut. W. L. Perley, formerly of the Bureau of Aircraft Production, Washington, D. C., has been made assistant to C. S. Rieman, president and general manager of the Elgin Motor Car Corp.

J. G. Cashin has joined the Acason Motor Truck Co., Detroit, as advertising manager. He resigned a similar position with the Standard Motor Truck Co. to join Acason. Donald F. Whittaker, who has held the joint title of advertising manager and assistant sales manager, will relinquish the duties of the advertising department to Mr. Cashin and will devote practically all of his time to his duties as assistant to Vice President and Director of Sales H. A. Conlon.

H. J. Porter has been made sales manager of the Timken Roller Bearings Co. of Canton, Ohio. Porter has been with the sales department of the company about eight years.

Complete Willys Corp. Organization Announced

NEW YORK, Oct. 28—Official announcement has been made that the Willys Corporation organization is now complete and the company is an active going concern.

The announcement follows:

John N. Willys, president; J. R. Harbeck, vice president in charge of New York executive office; C. O. Miniger, vice president in charge of Electric Auto-Lite division operation; J. Allen Smith, vice president in charge of New Process Gear unit operation; J. V. Hall, vice president in charge of car production; F. P. Decker, treasurer, and C. S. Mertz, secretary.

The directors are: John N. Willys, Edward F. Swift, F. S. Wheeler, J. H. Harbeck, Charles Stollberg, C. O. Miniger, J. Allen Smith, J. V. Hall, C. S. Mertz and J. E. Kepperly.

J. E. Lathan of the Lathan Auto Supply Co., Inc., San Francisco, has left for an extended trip into the Orient. He will visit China, Japan, Korea, India, French Indo China, Siam, the Malay States, Dutch East Indies, Philippine Islands, Hawaiian Islands, Australia and New Zealand.

Thomas G. Stallsmith of Los Angeles recently was appointed district sales manager for the Midwest Engine Co. of Indianapolis for the territory comprising California, Oregon, Washington, Idaho, Arizona, Utah and Nevada, specializing in distribution of the new Midwest Utilitor.

C. E. Curtis, auditor and director of the J. C. Wilson Co., makers of the Wilson truck, has resigned and will announce a new connection in a few days.

J. B. Childs, general manager of the Canton spring and forge plants of the Standard Parts Co., Cleveland, has been made general manager of the Perfection spring division. H. E. Clay succeeds him at Canton.

Harry S. Daniels, advertising manager of the Dort Motor Car Co., who has been undergoing treatment for rheumatism at Mt. Clemens, Mich., will be back at his desk next week.

W. Halsey Johnson has been appointed Western sales manager of the Macar Truck Co. Johnson was connected with the Mack Truck Co. and the International Motor Truck Co. for many years.

William Haggard, for 48 years associated with the tractor and implement industry, has retired. Mr. Haggard was a dealer for many years and was also associated with some of the largest tractor manufacturers in the United States.

C. P. Lord, formerly in the sales department of the company, has been appointed district manager of the Willard Storage Battery Co., in charge of the Detroit district office and lower Michigan.

Ignition Specialties Co. to Double Capacity

MILWAUKEE, WIS., Oct. 28—The Wisconsin Mfg. Co., organized recently at Menomonee Falls, Wis., to manufacture gas engine ignition specialties, is doubling its capacity to handle several large orders, among them one calling for 100,000 Ford timers from J. Wadsworth Staff & Co., Chicago jobbers. The new shop has orders sufficient to keep it busy for five or six months. Henry Storm is president and general manager.

RACINE TIRE CO. ENLARGES

RACINE, WIS., Oct. 25—The Racine Auto Tire Co., Racine, Wis., maker of Horseshoe tires, is effecting a decided increase in capacity by taking over and reconstructing a five-story factory building, 75x120 feet, formerly owned by the Fish Bros. Wagon Co. The building was partly gutted by fire nearly ten years ago and will be rebuilt as practically a new factory during the fall and winter months.

BUILDS CANADIAN FACTORY

WINDSOR, ONT., Oct. 24—The Fisher Body Co., Detroit, will build a five-story factory for the manufacture of closed automobile bodies, which will employ 200 men when completed. The company has a plant at Walkerville, Ont., where it manufactures open automobile bodies. The new plant will cost \$350,000. A by-law has been passed granting a ten-year fixed assessment of \$10,000.

TIRE PLANT FOR COLLINGWOOD

MONTREAL, Oct. 27—Announcement has been definitely made regarding the location of the new rubber plant of the Gregory Tire & Rubber Co., which is to be at Collingwood, near Kingsway. It is expected that the plant will employ approximately 50 men and will have an output of 300 tires and 600 inner tubes per day.

SERVICE IN OWN BUILDING

WABASH, IND., Oct. 28—The Service Motor Truck Co. has moved into its new building, constructed at a cost of \$150,000.

The administration building has more than 20,000 sq. ft. of floor space. In addition to the offices proper are to be found recreation rooms, offices for visiting distributors and dealers, and a huge auditorium where sales conventions can be held.

TIRE COMPANIES EXPAND

AKRON, Oct. 30—The Firestone Tire & Rubber Co. will erect a machine shop at plant No. 2, 315x325 ft. at a cost of \$148,000. An addition to the General Tire & Rubber Co., 60x100 ft., to cost \$60,000, also has been sanctioned by the city building commissioner.

\$60,000 PLANT FOR NEW ERA

GRAND RAPIDS, MICH., Oct. 29—The New Era Spring Specialty Co., manufacturers of bumpers, shock absorbers, tire-holders and other automobile specialties, will add a new factory.

Current News of Factories

Notes of New Plants —Old Ones Enlarged

TO BUILD NEW SAMSON PLANT

JANESVILLE, WIS., Oct. 25—The consolidation of the general executive departments of the Janesville Machine Co., power farm machinery, with the Samson Tractor Co. at the new plant in Janesville, Wis., is followed by announcement that work will begin at once on new shop units to accommodate the operating departments at the Samson plant as well. The fourth unit of the Samson works will consist of a three-story building, 80x620 ft., enclosing two one-story shops, 80x460 ft. These will be used exclusively for manufacturing the farm implements marketed in combination with the Samson tractor, and will be ready June 1, 1920. A new warehouse, 250x600 ft., and a parts and service building, 60x400 ft., also are included in the project for execution early next year. James A. Craig is president and general manager at Janesville.

AUTO BRASS CO. BUILDING

COLUMBUS, OHIO, Oct. 25—The Columbus Auto Brass Co. at 767 North Fourth street has started the erection of a building. This will house the enameling department, which will give five times the present capacity. The addition will be ready for occupancy in about six weeks.

SPRING MAKER DUBLES PLANT

JACKSON, MICH., Nov. 1—The Jackson Cushion Spring Co. will take over the plant of the Michigan Condensed Milk Co. Dec. 1, adding 700 employees to its force and doubling its output. The company furnishes springs for many of the automobile factories and the increased demand compelled it to seek larger factory space. Formed in 1901, at which time the company employed one man and one boy, there now are 700 employees on the payroll. Plans for expansion contemplate doubling the force.

BODY BUILDER TO ENLARGE

DETROIT, Oct. 25—Everett Bros., automobile body builders, have purchased the factory and real estate of the Murphy Chair Co., the transaction involving approximately \$1,500,000. The factory contains about 550,000 square feet of floor space and covers twelve acres. The present business of Everett Bros., now housed in five plants, will be centralized in the new factory and the output greatly increased.

CONVERTIBLE TRACTOR TO BUILD

GODERICH, ONT., Oct. 28—The Convertible Tractor Corp. of St. Paul, Minn., contemplates the erection here of a plant for the manufacture of their tractor attachments.

Indiana Tractor in Quantity Production

CLEVELAND, OHIO, Oct. 28—The Indiana Silo & Tractor Co., Anderson, Ind., has reached quantity production at the factory at Findlay, Ohio, and is making distributor connections for the purpose of covering the entire country with an aggressive campaign during the coming year on Indiana tractor. The following distributor connections have recently been made: Indiana Tractor Co., Los Angeles; Southeast Indiana Tractor Co., Atlanta, Ga.; Fulton Motor Truck & Service Co., Baltimore; Tractor Distributing Co., Albany, N. Y., and Richardson Manufacturing Co., Wooster, Mass. Throughout the corn belt the tractor will be handled by the Indiana Silo Co. organization.

START CLEVELAND ADDITION

CLEVELAND, Oct. 27—Ground has been broken for the \$200,000 addition to the plant of the Cleveland Automobile Co. The extension will be 200x80 ft. and will be of brick, steel and concrete construction, four stories high, and will increase production facilities for the Cleveland Co. by one-third.

ORGANIZED LABOR TO CONFER

WASHINGTON, Oct. 27—Organized labor will hold a conference of the representatives of all the bodies affiliated with the American Federation of Labor and the railroad brotherhoods, in Washington on Dec. 13.

HAMILTON MOTORS EXPANDS

GRAND HAVEN, MICH., Oct. 27—The Hamilton Motors Co., formerly the Panhard Motors Co., is now occupying its new factory which adjoins the old plant. The addition doubles the company's former capacity. The company recently opened an export office in New York in charge of C. B. Rice.

NEW TOOL MANUFACTURER

MILWAUKEE, WIS., Oct. 28—The Milwaukee Engineering & Tool Co. is the name of a new \$25,000 corporation formed by John B. Primm, Arthur R. Podlasky and J. Jaekle to manufacture and deal in tools, jigs, dies and machinery appliances of all kinds.

REMMEL ADDS NEW PRODUCTS

KEWASKUM, WIS., Oct. 25—The reorganization of the foundry and machine shop business conducted for many years at Kewaskum, Wis., by Nicholas Remmel, under the name of Remmel Mfg. Co., with a capital stock of \$50,000, presages the establishment of a large power farm machinery industry in Kewaskum. Officers of the new corporation are: President, L. P. Rosenheimer; vice president and general manager, Nicholas Remmel; secretary, George H. Schmidt; treasurer, Otto E. Lay. The plant will be enlarged and in addition to gas engines and implements, power corn huskers, concrete mixers, spray pumps, etc., will be made.

Calendar

SHOWS

Nov. 16-23—New York Automobile Salon, Hotel Commodore.
January—New York, International Automobile Mfrs' Congress.
 Jan. 3-10—New York, N.Y. Grand Central Palace, National Automobile Chamber of Commerce. S. A. Miles, Manager.
 Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.
 Jan. 8—Chicago. Airplanes, Manufacturers' Aircraft Association. Congress Hotel.
 Jan. 17-24—Cleveland. Nineteenth Annual Automobile Show, Cleveland Automobile Mfrs' and Dealers' Assn., Wigmore Coliseum.
 Jan. 24-31—Chicago, Ill. Coliseum. Cars: Drexel Pavilion. Trucks: National Automobile Chamber of Commerce. S. A. Miles, Manager.
 Jan. 24-31—Chicago. International Amphitheater, commercial cars and accessories.
 Jan. 31-Feb. 6—Kansas City, Mo. Annual exhibition, Overland Bldg. E. E. Peake, Manager.
 Feb. 9-14—Nashville, Tenn. Nashville Automobile Trade Association.

Feb. 21-28—Ottawa, Ont. Motor Show.

Feb. 23-28—Louisville, Ky. Twelfth annual exhibition, Louisville Automobile Dealers' Assn., First Regiment Armory.
February—Chicago. International Automobile Mfrs' Congress.

February—Deadwood, S. D. Annual show, Deadwood Business Club. F. R. Baldwin, Manager.

FOREIGN SHOWS

November—Christchurch, N. Z. First National Motor.
 Nov. 7-16—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
 December—Brussels. International Automobile Mfrs' Congress.
 Dec. 19-Jan. 4—International Aviation Exhibition, Paris, France.
 January—Glasgow, Scotland Scottish Motor Exhibition.
 February—Manchester, Eng. North of England Motor Exhibition.
 Feb. 23-March 6—Birmingham, Eng. British Industries Fair.
 March—London, Eng. Motor Boat, Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products Lyons Industrial Fair.

April or May—London, Eng. Commercial Vehicles Exhibition, Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

Nov. 3-8—Phoenix, Ariz. Tractor Demonstration, Arizona State Fair.

TRACTOR SHOWS

Oct. 30—Yerington, Nev. Tractor demonstration, Lyon County Farm Bureau.
 Nov. 22-29—Jacksonville, Fla. Florida State Fair and Exposition. B. K. Hanafourde, Manager.
 Feb. 9-14—Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy H. Hall, Manager.
 Feb. 9-14—Wichita Kan. Tractor and Farm Machinery, Forum, Wichita Thresher-Tractor Club.

CONTESTS

Nov. 2-3—El Paso, Tex. El Paso-Pheonix road race.

Nov. 27—Los Angeles, Cal. Ascot Speedway race.

Dec. 29—Los Angeles, Cal. Ascot Speedway race.

August, 1920—Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

CONVENTIONS

November—London, Eng. Road Transport Congress and Exhibition.

Nov. 3-8—Chicago, Ill. Convention, Automotive Equipment Assn., Medinah Temple.

Nov. 7-8—Detroit. Meeting of National Assn. of Motor Truck Sales Managers, Hotel Statler.

Nov. 10—Detroit. Service Managers' Convention.

Dec. 3-5—Cleveland. Ohio Automobile Trade Assn., annual convention.

January, 1920—Washington. Pan-American conference.

Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn., Tenth American Good Roads Congress and Eleventh National Good Roads Show.

May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

British Makers Join for Technical Research

LONDON, Oct. 5.—(Special correspondence)—A meeting was held here recently to organize a plan of cooperative technical research by the British motor trade. It is under the auspices of the British Motor and Allied Manufacturers, and is being supported by about 20 firms. It is reported that an annual income of about \$50,000 is assured for the next five years.

The scope of the movement is to keep the British motor industry abreast of, or ahead of competition. This program would be more convincing if there was some concrete evidence of the trade's having digested the claims and need of standardization, etc., and if there was some prospect of manufacture being commenced on pre-war lines.

At present there is practically a cessation of castings due to the national strike of iron-moulder, with which the trade is only indirectly concerned, but is being penalized by the hold-up of output. However, so far as concerns technical research there is some prospect of better things.

Both the universities of Sheffield and Birmingham are likely to help in a practical way in this connection. Sheffield is interested in certain steel and other metallurgical problems, while Birmingham is at work on such matters as carburation in relation to the velocities of the air, and the use of producer gas for driving vehicles.

There is room for a third line of research, namely, into the factors making for shop equipment and the management of men, or, as it may be called, commercial engineering. It is a curious fact that the largest motor works here are the least conspicuous for realizing fully their opportunities and some of them are more or less hot-beds of industrial strife. The new research effort has unlimited scope and some first hand difficulties to deal with.

FOREIGN TRADE OPPORTUNITIES

WASHINGTON, Oct. 25.—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobile or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign & Domestic Commerce and specify the Foreign Trade Opportunity number.

An agency is desired by a firm in Italy for the sale of heavy motor trucks, motor cranes (mounted on automobiles) light, medium and heavy automobiles, and trucks for farm work. Correspondence should be in Italian. References. 30990.

A firm in Norway desires to secure an agency for the sale of automobiles and supplies, and tires. Quotations should be given c. i. f. Norwegian port. Terms, preferably 90 days. Reference. 30992.

A representative of an Australian house importing machinery, now in the United States, desires to secure agencies for the sale of motor trucks, oil and gasoline engines. References. 30985.

A firm in France desires to secure agencies for the sale of medium grade passenger cars. Correspondence should be in French. Reference. 30994.

An agency is desired by a man in Morocco for the sale of bicycles and spare parts thereof. Quotations should be given c. i. f. African port. Correspondence should be in French. Reference. 31026.

A syndicate, comprising the leading merchants and exporters in a district of Spain, has been organized for the purchase and operation of a large number of motor trucks. These are required for the transportation of merchandise from the factories and warehouses, many of which are located at some distance from the city, to wharfs and railroad stations. 31015.

An agency is desired by a business man in Spain for the sale of electrical machinery and material, automobile accessories and bare copper wire. Correspondence may be in English. Reference. 31048.

An agency is desired by a man in Algeria for the sale of bicycles and motor cars. Quotations should be given c. i. f. African port. Terms, payment against documents. Correspondence should be in French. Reference. 31053.

An automobile to carry five or six passengers, to cost less than \$1500, preference given to car costing less than \$1000, to be a good hill climber, and have a self starter, is desired by a man in Guadeloupe. Quotation should be given c. i. f. Guadeloupe. Payment, sight drafts 20 or 30 days on bank. Correspondence should be in French. 31054.

Importers in Turkey are in the market for automobiles, trucks and traction autos. Reference. 31038.

The representative of a machinery company in Australia will soon arrive in the United States and desires to secure agencies for the sale of motor trucks and oil and gasoline engines. 31056.